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**REPORT ON**

**ENVIRONMENTAL MANAGEMENT  
PROGRAMME FOR THE KUSILE  
POWER STATION 60 YEAR ASH  
DISPOSAL FACILITY**

**Report No : 12712-46-Rep-001-EMPr-Rev1**

**Submitted to:**

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## LIST OF ACROYNYS

ADF	Ash Disposal Facility
BH	Borehole
dBA	Decibel
DEEEP	Direct Estimation of Ecological Effect Potential
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ES	Environmental Specifications
GN	Government Notice
IEM	Integrated Environmental Management
ISO	International Organization for Standardization
NAAQS	National Ambient Air Quality Standards
PES	Present Ecological State
PM	Project Manager
PM <sub>10</sub>	Particulate Matter up to 10 micrometers in size
PM <sub>2.5</sub>	Particulate Matter up to 2.5 micrometers in size
PPP	Public Participation Process
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SASS5	Scoring Procedure for Aquatic Bio-monitoring
SHEQ	Safety Health Environment and Quality
<u>WMCO</u>	<u>Waste Management Control Officer</u>

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## **1 BACKGROUND INFORMATION**

### **1.1 CONTEXT AND OBJECTIVES OF THIS EMPr**

The preparation of an Environmental Management Programme (EMPr) is recognised as a tool in Integrated Environmental Management (IEM) to mitigate or minimise negative impacts and enhances positive impacts on site. Typically an EMPr document is aligned to the project life cycle addressing each project phase i.e. the Construction, Operation and Decommissioning phases.

An EMPr, in the context of the Environmental Impact Assessment (EIA) Regulations (2010), is a tool that takes a project from a high level consideration of issues down to a detailed workable action plan that can be implemented in a cohesive and controlled manner. An EMPr is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction phase of a project are prevented and that the positive benefits of the projects are enhanced”. Impacts range from those incurred during project initiation (site clearing, erection of the construction camp) to those incurred during decommissioning and post-closure. Specifically, the objectives of this EMPr can be articulated as follows:

- To give effect to the project phase related requirements;
- To give effect to the environmental commitments of the various role players;
- To ensure that these requirements / commitments are expressed in a manner that is accessible to all parties and is binding upon those responsible for project implementation;
- To ensure that sufficient resources are allocated to the project budget in order to give effect to the environmental requirements / commitments, and to ensure that the scale of EMPr-related interventions is consistent with the significance of identified impacts;
- To provide a coherent and pragmatic framework for the implementation of the requirements, ranging from the roles and responsibilities of the key project participants to the auditing and reporting of compliance;
- To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the EIA process; and
- To ensure that the project does not result in undue or reasonably avoidable adverse environmental impacts, and that any potential environmental benefits are enhanced.

This report constitutes the EMPr for the Kusile Power Station 60 year Ash Disposal Facility. This EMPr has been compiled according to the findings of the EIA, and is included as an appendix to the EIA for consultation purpose. The EMPr accompanies the EIA which will be submitted to the authorities for decision making.

## 1.2 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

In terms of the National Environmental Management Act ([NEMA] No 107 of 1998) and Environmental Impact Assessment (EIA) Regulations (Government Notice Regulation [GNR] 543 to 546, June 2010) the proponent must appoint an EAP to undertake an EIA and / or Public Participation Process (PPP) for listed activities regulated in terms of the aforementioned act. In this regard, Eskom appointed Zitholele Consulting (Pty) Ltd. (Zitholele) to undertake the EIA for the proposed project, in accordance with the aforementioned regulations.

Zitholele is an empowerment company formed to provide specialist consulting services primarily to the public sector in the fields of Water Engineering, Integrated Water Resource Management, Environmental and Waste Services, Communication (public participation and awareness creation) and Livelihoods and Economic Development.

Zitholele Consulting has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations. The details of the key individual representing Zitholele, and acting as the EAP on this project are given below.

### Mathys Vosloo, Project Manager

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Dr Mathys Vosloo graduated from the Nelson Mandela Metropolitan University with a PhD in Zoology in 2012. Over the past few years Mathys has been involved in a variety of projects and has undertaken environmental authorisations ranging from the construction of roads, rehabilitation of dam wall infrastructure, development of low cost housing, to electricity generation and transmission projects. Mathys has also been involved in the development of strategic environmental assessments and state of the environment reporting, and has developed numerous environmental management programmes during the course of his career. With more than 10 years of environmental and scientific field experience and more than 7 years in environmental consulting Mathys has gained an advanced and holistic understanding of environmental management in the built environment.



### 1.3 WHO IS THE PROPONENT?

Eskom Holdings SOC (Ltd) is the South African utility that generates, transmits and distributes electricity. Eskom supplies ~ 95 % of the country's electricity, and ~ 60 % of the total electricity consumed on the African continent. Eskom plays a major role in accelerating growth in the South African economy by providing a high-quality and reliable supply of electricity.

### 1.4 LEGAL CONTEXT

Environmental legislation in South Africa was promulgated with the aim of, at the very least, minimising and, at the most, preventing environmental degradation. The Acts and Regulations applicable to the Kusile 60 year ADF Project are summarised in Table 1-1.

The list below was compiled to ensure that the applicant is aware of their legal responsibilities and liabilities during the implementation of the ash disposal facility.

The Contractor should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. Non-compliance to environmental law is a criminal offence and if prosecuted Eskom will be liable for any environmental damage incurred.

**Table 1-1: Legal requirements applicable to this EMPr**

Act	Act no	Notes/remarks
The Constitution	108 of 1996	Includes the Bill of Rights, Environmental rights, Rights to property, Administrative justice and Access to information, <i>inter alia</i> .
National Environmental Management Act (NEMA)	107 of 1998	List of activities and competent authorities identified in terms of Sections 24 and 24D.
National Environmental Management: protected Areas Act (NEM:PAA)	57 of 2003	Provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes.
National Environmental Management: Biodiversity Act (NEM:BA)	10 of 2004	Strategy for achieving the objectives of the United Nation's Convention on Biological Diversity, to which South Africa is a signatory.
The National Environmental Management: Waste Act (NEM:WA)	59 of 2008	Stipulate National and provincial norms and standards, and waste service standards. Identified priority waste and waste management activities. Also includes principles for reduction, re-use, recycling and recovery of waste, and waste management activities and contaminated land.
National Environmental Management: Air Quality Act (NEM:AQA)	39 of 2004	Control of dust, noise and offensive odours. Further deals with Air Quality Management Measures, and licencing of listed activities. The National Dust Control Regulations (GNR. 827 of 1 November 2013) prescribes general measures for the control of dust in all areas.
National Water Act (NWA) and regulations	36 of 1998	Deals with prevention and remedying the effects of pollution, control of emergency incidents, and the use of water and licencing.

Act	Act no	Notes/remarks
Conservation of Agricultural Resources Act	43 of 1983	Control of utilisation and protection of wetlands; soil conservation; control and prevention of veld fires; control of weeds and invader plants.
Atmospheric Pollution Prevention Act	45 of 1964	Provides for control of dust control and air pollution.
National Heritage Resources Act	25 of 1999	Section 38 provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA.
Fencing Act	31 of 1963	Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.
National Forest Act	84 of 1998	No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7(4) or section 23.
Veld and Forest Fires Act	101 of 1998	Prevention of unauthorised veld and forest fires
Hazard substances Act, and regulations	15 of 1973	Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.
Occupational Health and Safety Act	85 of 1993	Prescribes health and safety measures necessary to adhere to for all construction workers
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act	36 of 1947	Control of the use of registered pesticides, herbicides (weed killers) and fertilisers. Special precautions must be taken to prevent workers from being exposed to chemical substances in this regard.
Emalahleni Local Municipality Integrated Development Plan Final Draft	2014/2015	The Integrated Development Planning is regarded as a tool for municipal planning and budgeting to enable municipalities to deliberate on developmental issues identified by communities.
Emalahleni Local Municipality By-laws	2014	One of the Key Performance Indicators included in the Integrated Development Plan (2014/2015), includes the compilation and review of the following relevant by-laws by June 2014: Management & Control of Informal Settlements & Land invasion. Waste Management. Recreational Resort. Outdoor Advertising. Nature Conservation. Air Quality Management.
<u>Mpumalanga Biodiversity Conservation Plan (MBCP)</u>	<u>2005 - 2006</u>	<u>The Mpumalanga Biodiversity Conservation Plan is used as a land-use planning tool for the Mpumalanga Province.</u> <u>The Systematic Conservation Planning process uses more than 340 Biodiversity features and targets in the fine-scale analysis.</u>
<u>Gauteng Conservation Plan Version 3.3</u>	<u>2012</u>	<u>C-Plan 3.3 is a valuable tool to ensure adequate, timely and fair service delivery to clients of GDARD, and is critical in ensuring adequate protection of biodiversity and the environment in Gauteng Province.</u>

## **2 PROJECT DESCRIPTION**

Kusile Power Station, located approximately 20 km from Bronkhorstspuit in the Mpumalanga Province (Figure 1), is a coal fired power station currently under construction by Eskom. The power station will employ “dry ashing” facilities for the disposal of its ash, and currently has an approved ash disposal facility in place that can accommodate approximately 10 years of co-disposed ash and gypsum. Due to the impact of additional abatement technology on ash for disposal, changes in coal ash percentages where coal with more ash is burnt, and the compliance requirements for environmental legislation, the current facility will not be adequate. An additional facility is therefore required to accommodate ash disposal for the life of the station.

A comprehensive comparative site assessment process revealed site A to be the most preferred site alternative. Site A is positioned south of the power station. It is wedge shaped, starting wide in the north and becoming narrower as it develop southwards.

Due to the site constraints the space is limited which consequently requires the ash facility to start near final height instead of typically starting near ground level and building an approach ramp at a slope of 1[v]:20[h] up to final height. Therefore a substantial starter platform is included in the design. The starter platform will be constructed from ash using a truck and haul operation. The platform will also need to be lined.

Site A (Figure 2-1) is characterised by a valley draining from the south-east to the north-west forming the Holfonteinspruit. This valley will continue to lead clean storm water into the site for the duration of operations and therefore requires a combination of contour cut-off drains and clean storm water attenuation dams. A dam and a diversion canal system upstream of the New Largo Phola Conveyor will also be required. A river diversion will further be required for the Klipfonteinspruit, which is located along the northern side of the site.

### **2.1 PROJECT COMPONENTS**

The detailed conceptual design of the 60 year ash facility at Kusile Power Station consists of the following components:

- A lined starter platform constructed of ash with a storage capacity of 5 years;
- A lined ash facility with a storage capacity of 55 years;
- Clean and contaminated water separation and storage infrastructure including:
  - Pollution control dams (PCDs);
  - Contaminated storm water trench network;
  - Klipfontein river diversion and stilling basin;
  - Clean storm water diversion trenches and berms;
  - Clean storm water contour cut-off drains;
  - Clean storm water holding dams;
  - Clean storm water transfer drains.

- Pipelines:
  - For transporting water between the PCDs and the Power Station;
  - For transporting water for dust suppression and irrigation;
  - For transporting water between the clean water holding dams and the contour drains.
- Access roads around the facility;
- A fence line around the facility;
- Relocation of existing infrastructure including a power line that runs through the site; and
- Rehabilitation and topping of the ash facility with topsoil.

For the design and recommendations of the above mentioned, please refer to the Conceptual Design Report.

## **2.2 WASTE CLASSIFICATION**

Waste classification was carried out in terms of DEA's waste classification regulations published in R635 of 23 August 2013 in terms of the provisions of the NEM:WA (Act 59 of 2008).

Ash samples were taken from Kendal Power Station as they are considered the closest approximation of the ash expected at Kusile Power Station. Total extraction analysis was carried out on the ash sample. Australian de-ionised water leach tests were also carried out on the ash and an analysis of the leach solution was conducted.

The ash is classified as a Type 3 waste (low hazard waste). Therefore the ash requires disposal on a landfill with a Class C barrier system. This classification was the result of the leachable concentration of boron and the total concentration of barium and fluoride in the ash.

## **2.3 THE BARRIER SYSTEM**

The barrier is designed according to the National Norms and Standards for the assessment of waste for landfill disposal (R635 of 23 August 2013). As the ash is classified a Type 3 waste, the barrier has been designed according to the Class C lining specification as shown in Figure 2-2.

The barrier for the facility will be installed every five years coinciding with the commencement of each 5 year development stage. This is to reduce risk of damage due to exposure for long periods of time. Careful planning is required to ensure smooth development of the facility as the liner is required to be installed before the ash facility reaches the capacity of the previously lined area. The liner installation is a lengthy process,



The barrier system includes a substrate preparation layer, subsoil drainage layer, primary impermeable layer, primary geomembrane layer and a leachate collection layer (Figure 2-2 and Figure 2-3).

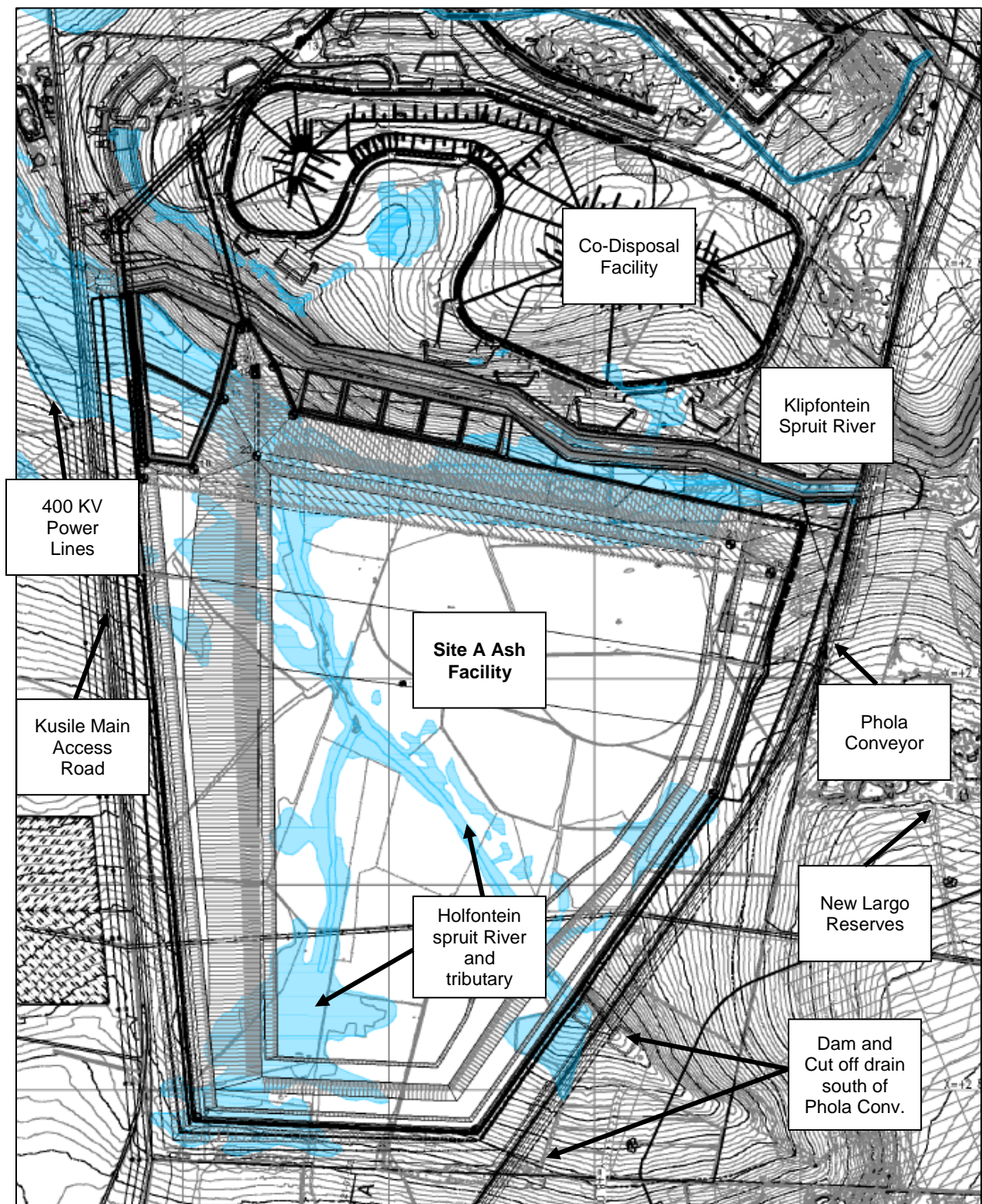
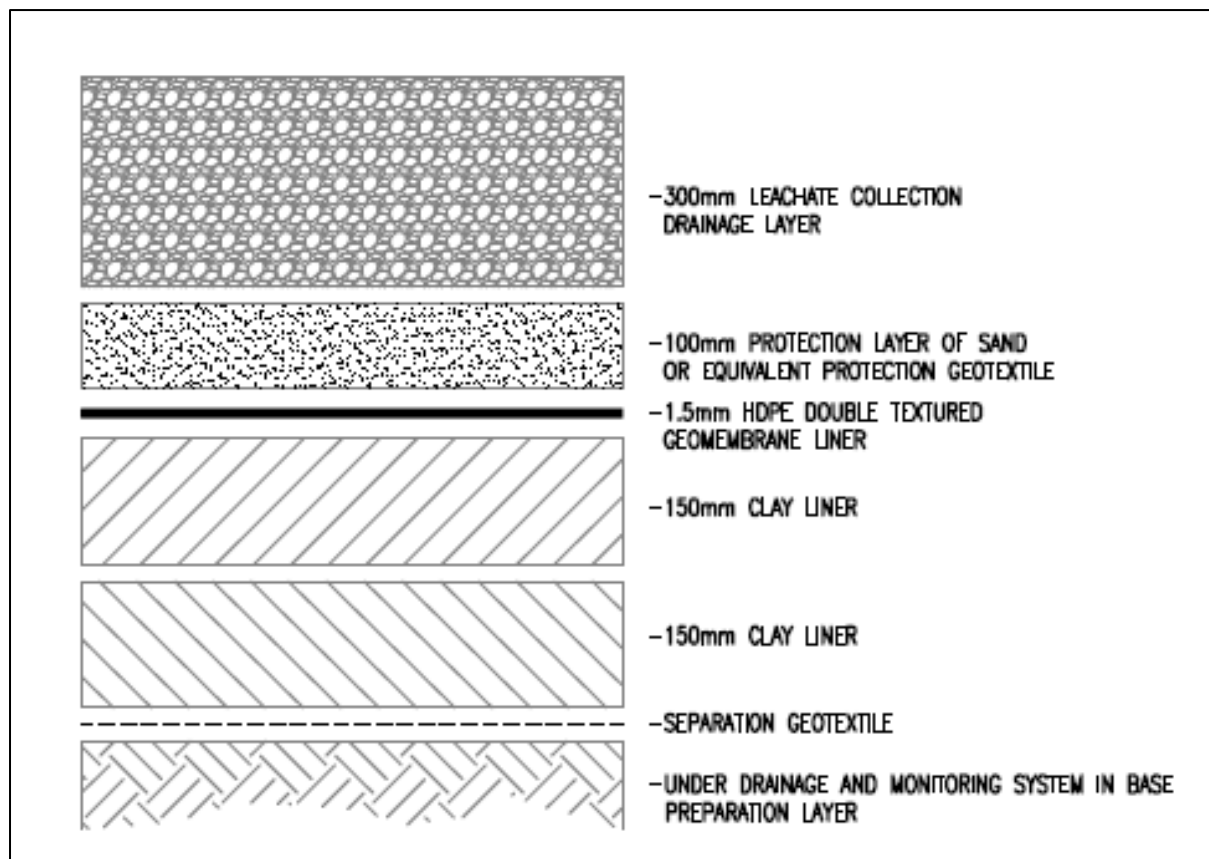
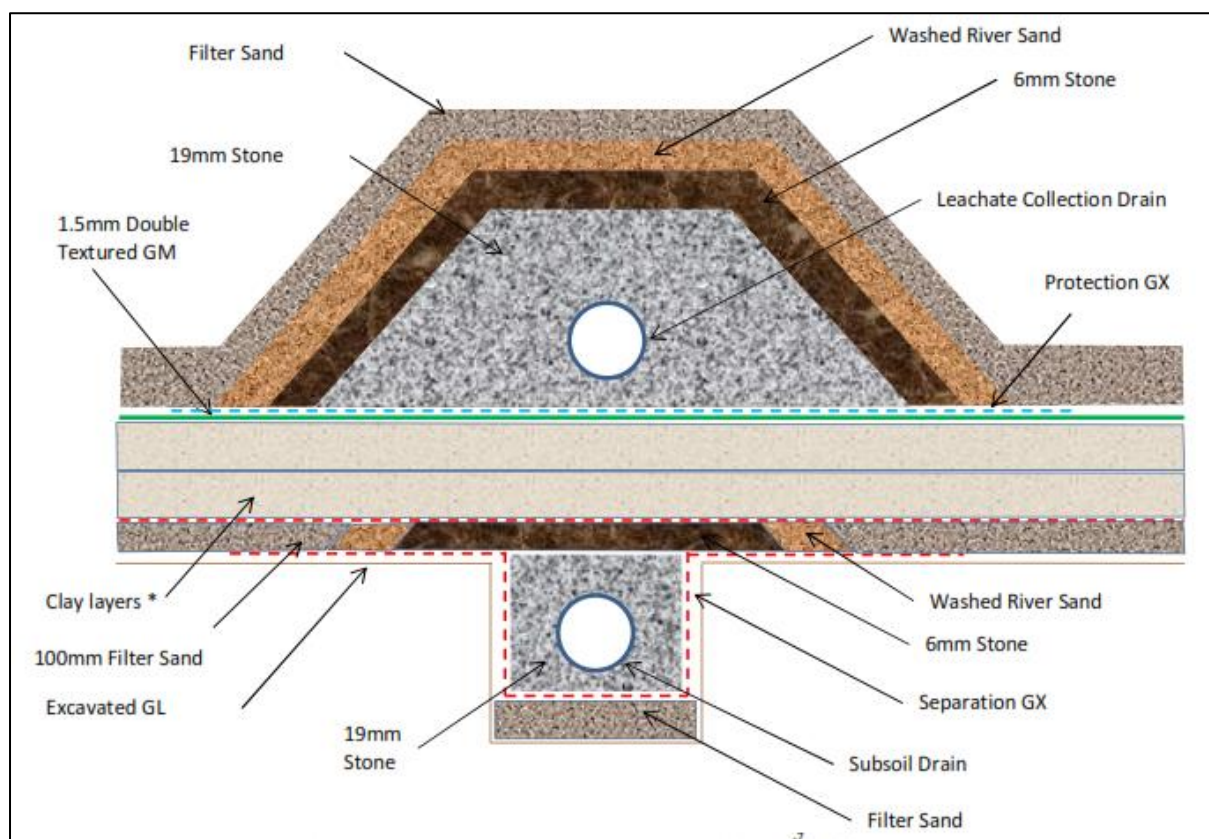


Figure 2-1: Site A Layout



**Figure 2-2: Class C Liner Specification**



**Figure 2-3: Barrier system applied to site conditions showing leachate and sub-soil conditions**



The barrier system of the ADF and the PCDs will decrease the potential for leaching to the environment significantly. The ADF has a large buffer capacity meaning that it will take a long time for leachate to generate above the lining system. The lining system will have a leachate collection layer which will help to drain the leachate away before it can form a significant pressure on the lining system.

## 2.4 CONVEYOR SYSTEMS AND STACKERS

Due to the underlying geology not offering sufficient strength to support a front stack of more than 15 m a multi-level stacker setup, similar to the arrangement at Majuba Power Station, will be used. The bottom stack will consolidate the underlying clay layers, increasing their strength in time to support the Top Stacker's high front stack and 12 m back stack as shown in Figure 2-4.

If one or both stackers are out of commission, ash will temporarily be offloaded onto the emergency ash platform situated after the additional transfer houses required for the overland conveyor.

The overland conveyors are connected to a moving head system which can extend past the transfer point and deposit ash onto the emergency platform. The extended length is supported by a wall which also retains the ash until it can be moved by mobile equipment.

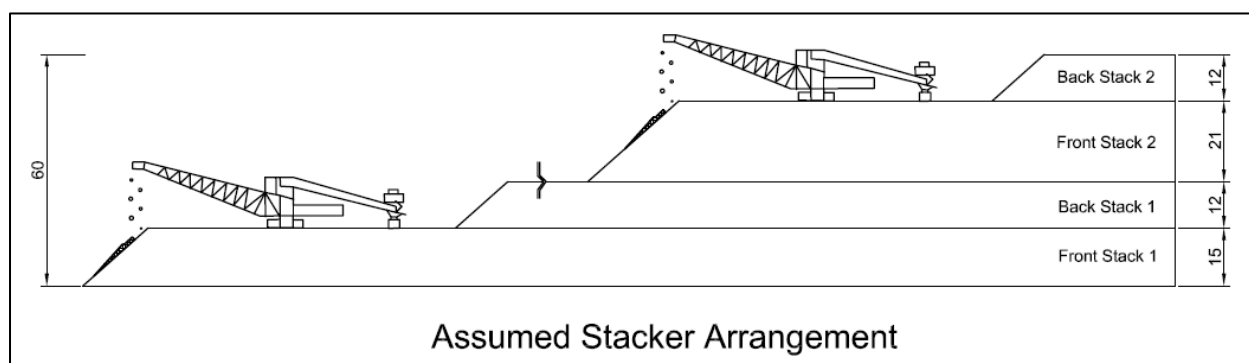


Figure 2-4: Multi Stacker Philosophy

## 2.5 PROGRESSIVE TOPSOIL MANAGEMENT

The topsoil of the Starter platform and the first 5 years lined area (5 to 10 year development) is stockpiled for later use near the end of the facility. The topsoil in the footprint of the 10 to 15 year development is used to rehabilitate the initial development of ash facility. This process then repeats itself until the last area (55 to 60 year development). The topsoil in the stockpile is then used to rehabilitate the last area. There may be a need for additional topsoil during the rehabilitation of the facility. Figure 2-5 shows the method of progressive topsoil management.

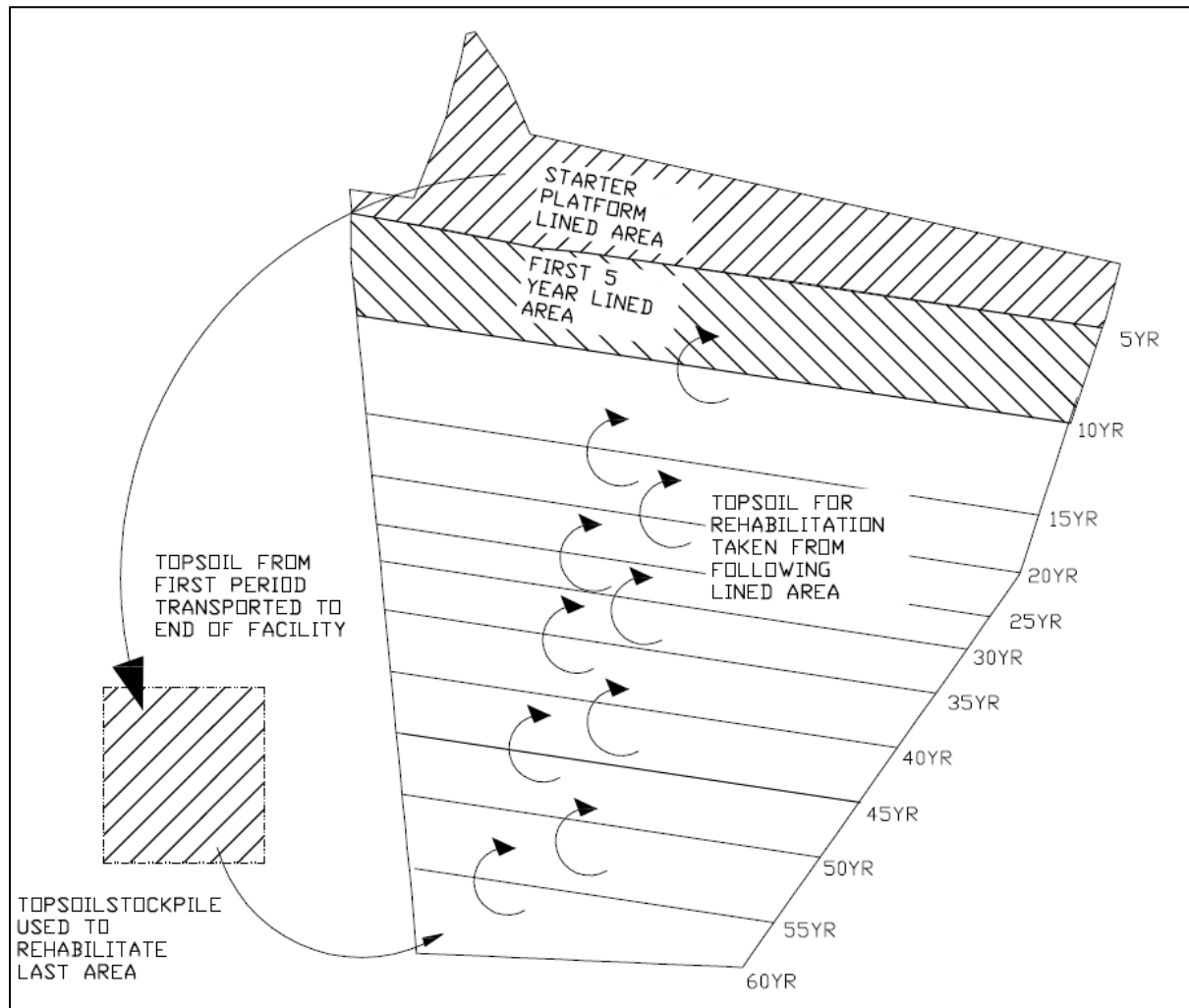


Figure 2-5: Method of progressive topsoil management

## 2.6 DUST SUPPRESSION AND IRRIGATION INFRASTRUCTURE

The ash arrives at the facility with a raised moisture content of approximately 10%. The aim of the dust suppression system is to ensure that the moisture content is maintained to reduce dust blow. The source of the dust suppression and irrigation water will be sourced from the surrounding pollution control dams or existing Kendal-Kusile water pipeline. Water requirements during operation of the ADF is approximately 900% more volume than the construction requirements as these areas will continuously need to be wetted during operations whereas the area during construction will only require wetting during a single period.



## 2.7 INFRASTRUCTURE RELOCATIONS

The following infrastructure relocations will be required:

- Two 88 kV power line that runs through the site in an east - west direction.
- Two 11kV Largo B Largo B lines in north eastern corner of the site.
- The Co-Disposal Facility's security fence.

Space within the Eskom property investigated exists around the southern boundary (2 x 88 kV) and around the north eastern boundary (11 kV) of site A where the distribution lines can be relocated in order to maintain connectivity. The ADF will develop from north to south within site A, therefore the relocation of the 88kv power lines (Figure 8 13) in the south of the site is only expected during the latter stages of the ADF development. The proposed relocation of the distribution lines are presented in design drawings provided in Appendix G of this FEIR. Relocation of the 11 kV power lines will occur within the property owned by Eskom and will be undertaken before site preparation of the starter platform will commence.

## 2.8 SITE FACILITIES

The following site facilities will be constructed on site:

- Site office: The Site Office is located in the north western corner of the facility. The office includes three offices, one 10 seat meeting room, a kitchenette and a dining hall. Male and female ablutions are also provided.
- Workshop and Store: A workshop and store, both 6 x 10 m in size, with vehicle access, are provided. An oil spillage sump outlet to outside containment facilities is included.
- Vehicle maintenance: A service bay and wash bay with oil trap facilities.
- Contractor Yard: 50 x 50 m yard including one Site Agent Office, kitchenette with attached dining hall and male & female ablutions.

## 2.9 INFRASTRUCTURE NEEDS UNDER ADF DEVELOPMENT PERIODS

With the development of the ADF in five year intervals, infrastructure requirement associated with each phase of the development may be different. Construction processes under the various development periods are presented in Table 2-1.

Further details on the project description and development activities is available in Chapter 8 and 9 of the FEIR and in Appendix G and H of the FEIR

**Table 2-1: Infrastructure requirements under various development periods**

	A	B	C	D	E	F	G	H	I	J
1	Ash facility operation period:	Lined Area: (Ha)	Required Pollution Control Dams	Clean SW contour cut-off drains	Clean Storm Water Infrastructure	Access Road	Contaminated Storm Water Network	Rehabilitation	Other	Redundant Infrastructure
2	Starter Wall: 0-5 year life	120.5	PCD 1 - 7	Main Clean SW Contour cut-off drain in footprint and east of Phola Conveyor	- Dam D10 - New Largo Dam - Klipfonteinspruit River Diversion incl. stilling basin - Clean water side drains - Clean water diversion berms	- Access Road around starter platform footprint and along fence up to 20 year development line (+15 yr) - Haul Road to Starter Platform	Northern, eastern and western sides.		- Topsoil Stockpile area	
3	5 – 10	127.5		5 -10 yr Clean SW Contour cut-off drain	- Dam D1	Access Road around footprint	Extend east and western sides	Rehabilitate Starter platform  Rehabilitate 5 – 10 year development	- Conveyor platforms up to starter platform - Emergency Stockpile Platforms 1 and 2	
4	10 – 15	120.1		10 -15 yr Clean SW Contour cut-off drain	- Dam D2	Access Road around lined footprint	Extend east and western sides	Rehabilitate 10 – 15 year development		- Dam D1
5	15 – 20	67.9		15 -20 yr Clean SW Contour cut-off drain	- Dam D3A and D3B	Access Road around lined footprint	Extend western side	Rehabilitate 15 – 20 year development		- Dam D2
6	20 – 25	55.7		20 -25 yr Clean SW Contour cut-off drain	- Dam D4A and Dam D4B	Access Road around lined footprint and along fence up to 40 year development line (+35 yr)	Extend western side	Rehabilitate 20 – 25 year development		- Dam D3A and D3B
7	25 – 30	37.2		25 -30 yr Clean SW Contour cut-off drain	- Dam D5A and D5B	Access Road around lined footprint	Extend western side	Rehabilitate 25 – 30 year development		- Dam D4A and Dam D4B
8	30 – 35	48.9		30 -35 yr Clean SW Contour cut-off drain	Dam D6A and D6B	Access Road around lined footprint	Extend western side	Rehabilitate 30 – 35 year development		- Dam D5A and D5B
9	35 – 40	55.8		35 -40 yr Clean SW Contour cut-off drain	Dam D7A and D7B	Access Road around lined footprint		Rehabilitate 35 – 40 year development		Dam D6A and D6B
10	40 – 45	51.1		Main Clean SW Contour cut-off Outlet pipe 1.0m Diameter concrete pipe	Dam D8A and D8B	Access Road around lined footprint and along fence up to 60 year development line (+55 yr)		Rehabilitate 40 – 45 year development		Dam D7A and D7B
11	45 – 50	46.5		Main Clean SW Contour cut-off Outlet pipe 1.0m Diameter concrete pipe	Dam D9	Access Road around lined footprint		Rehabilitate 45 – 50 year development		Dam D8A and D8B
12	50 – 55	48.2		Main Clean SW Contour cut-off Outlet pipe 1.0m Diameter concrete pipe		Access Road around lined footprint		Rehabilitate 50– 55 year development		
13	55 – 60	39.8		Clean SW transfer drain		Access Road around lined footprint		Rehabilitate 55 – 60 year development		
14	Decommissioning	0				Access Road and security fence around entire existing facility		Carry out final rehabilitation		- PCD 2 and PCD 4 to 7

Note:

1. Infrastructure requirements for previous periods apply to subsequent periods unless included in Redundant Infrastructure (Column J)

### 3 IMPACTS AND RECOMMENDATIONS

The following were extracted from the specialist studies which were compiled for the EIA phase.

#### 3.1 AQUATIC ASSESSMENT

##### 3.1.1 Findings

The Wilge River was considered most sensitive in terms of aquatic ecosystems. Sites sampled within the Wilge River had a high diversity of aquatic macroinvertebrates and a high prevalence of sensitive biota, including the shortfin suckermouth, *Chiloglanis pretoriae*, which is sensitive to changes in water quality, substrate modifications and flow regime. The population *C. pretoriae* in the Wilge River represents one of the few remaining populations in the upper Olifants River catchment.

A number of Wilge River tributaries had good water quality, notably sampling sites T1 and T2 situated directly west of site A, and the Holspruit (Site A). The Klipfonteinspruit was identified as being the most severely impacted by upstream activities. In particular, high volumes and velocities of water entering the Klipfonteinspruit from upstream developments, including the Kusile Power Station, has caused severe erosion of the channel, thus seriously compromising habitats available to aquatic biota, as well as water quality. The tributary that enters the Klipfonteinspruit from the Kusile construction site had a critically low diversity of aquatic macroinvertebrates and a complete absence of fish as a result of erosion and turbidity.

The major impacts of the Ash Disposal Facility are likely to include:

- Loss of aquatic habitats through direct wetland destruction;
- Loss of habitats and wetland/riparian buffer zones through erosion;
- Loss of habitats and buffer zones through sedimentation;
- Contamination of surface water through contaminated surface runoff, wind-blown contaminants and leaching via groundwater;
- Turbidity causing deterioration in water quality will affect aquatic species; and
- Overall decline in aquatic biodiversity because of all of the above.

The major impacts at conveyor crossings are likely to include:

- Water quality impacts due to spills and leaks;
- Erosion (and sedimentation) at wetland crossings as well as downstream of crossings;
- Disturbance or loss of marginal and riparian habitats;
- Disturbance of riparian migration corridors; and
- Altered flow regimes downstream of watercourse crossings.

### **3.1.2 Conclusion and Recommendations**

The Kusile 60-year Ash Disposal Facility is likely to have significant impacts to aquatic ecosystems in terms of water quality and habitat integrity. These impacts can, however, be mitigated on-site with effective storm water management and careful design of diversions according to ecological principles, including creation of habitats and mimicking natural hydrological patterns.

Impacts due to the conveyor are likely to be relatively minor, restricted to two wetland crossings, and mainly limited to the operational phase. At a catchment level, only one quaternary catchment and two watercourses will be impacted upon, making it easier to mitigate impacts on site and contain spills, thus preventing impacts to the Wilge River.

A number of additional off-site mitigation and rehabilitation measures should also be considered for Site A so as to manage impacts to water resources at a catchment level. Effective implementation of all mitigation should, however, reduce the overall project impact to a moderate level at a district level, with an overall residual risk of 'Moderately High'.

## **3.2 GROUNDWATER ASSESSMENT**

### **3.2.1 Findings**

The potential effects on groundwater are part of the primary environmental concerns when a landfill is proposed for waste disposal. Such effects are of particular importance in the case of residual coal ash landfill (disposal). In general, the quality and the quantity of the groundwater system underlying and down gradient to the disposal may be affected. The impact on the groundwater quantity is expected to be progressive as construction of the total terrace will be through multiple phases over 60 years.

The following impacts have been considered and quantified during the construction phase:

- Increasing of infiltration rates;
- Decreasing of the soils buffering capacity;
- Deterioration of groundwater quality due to construction waste (toxic construction material);
- Deterioration of groundwater quality due to hydrocarbon spills from storage, and diversion of fuel pipes (organic contaminants);
- Altered Flow systems.

The following impacts have been considered and quantified during the operational phase:

- Groundwater pollution due to potential seepage, leachate infiltration (leak of liner) from ADF, contaminated water trenches and pollution control dams;
- Alteration of the groundwater flow system due to groundwater pumping (different uses).

The following impacts have been considered during the closure and post-closure phase:

- Deterioration of groundwater quality due to waste, and spills related to closure activities;
- Groundwater pollution due to seepage, leachate infiltration (leak of liner) from ADF, contaminated water trenches and pollution control dams;
- Alteration of the groundwater flow system due to groundwater pumping (different uses);
- Reduction in infiltration rates.

### **3.2.2 Conclusions and recommendations**

The following conclusions are reached by the groundwater specialist:

- The groundwater flow directions in the study areas follow the topography;
- The groundwater uses (withdrawal) in the study area does not dramatically impact on the natural groundwater drainage;
- A general reduction in groundwater storage is observed at the north of site A;
- Comparative geohydrological impact risk assessments conducted throughout the different phases of the project confirms that Alternative A is a preferred scenario from a groundwater resource protection point of view;

The following recommendations were made by the groundwater specialist:

- Detailed field and numerical studies need to be conducted to:
  - Better delineate the current extent of groundwater contaminations surrounding each of the preferred scenario sites;
  - Understand the link between surface and groundwater;
  - Understand the link between the considered shallow aquifer systems and the deeper aquifer systems;
  - Develop a scoping remediation sign the pumping well field for mitigation actions;
- The existing water monitoring network at the Kusile Power Station, need to be extended by considering the initial monitoring network as proposed in the present monitoring plan, according to the preferred alternative;
- The Initial Groundwater flow and transport model need to be updated based on groundwater monitoring data (water level and quality) in the local aquifer surrounding site A, and accounting for heterogeneity;
- All the prescriptions of the management plan need to be considered and special attention should be given to the pre-construction mitigation measures;
- The possible cumulative impacts from the New Largo mine need to be investigated in more detail using the groundwater model.

### **3.3 HYDROLOGY AND WATER QUALITY ASSESSMENT**

#### **3.3.1 Findings**

The agricultural activities on site have had limited impact on the water resources quality, while farm dam construction has resulted in some flow alteration. Impacts expected to materialise as consequence of the construction activities required for the establishment of the 60 year ADF, and the associated infrastructure such as conveyors, access roads and storm water management facilities include:

- Loss of streams;
- Disturbance to streams;
- Increased sediment transport into water resources;
- Increased erosion;
- Water quality deterioration in adjacent water resources; and
- Altered flows.

Loss of flow at the outlet of catchment B20F due to destruction of streams within the footprint of Site A is expected to be an average reduction of 1,6 % of the base flow. Only the footprint required for the first five years of ash deposition will be cleared and prepared during the construction phase so the loss of water resources is expected to be greatest during the operational phase.

#### **3.3.2 Conclusions and recommendations**

The following conclusions can be made as a result of this study:

- The flow reductions from a quaternary catchment perspective as predicted by the modelling are small (<2%) for all the sites;
- The Klipfonteinspruit (where site A is located) was identified as being impacted by upstream mining activities and the impact that will emanate from Kusile co-disposal site. This stream receives discharge from the upstream mine area. In relation to the location of Kusile Power Station within the catchment, it is likely that it could have an impact on the Wilge River from the tributaries running up and downstream of the power station site and the mine activities are likely to add to the cumulative impacts in the catchment;
- The Wilge River has been classified as a Class II river which means that it needs to be protected and maintained in the state that it currently is. In terms of surface water quality it is therefore important that best practise is employed when undertaking ash disposal activities.
- If Kusile Power Station implements a comprehensive storm water management plan for the power station and the ADF this will help in managing negative effects from the power station. However the power station should work closely with New Largo to ensure that the storm water management plans for the two facilities (power station and mine) complement each other and are sustainable in the long term.

- In all cases an adequate surface water monitoring programme that would include biomonitoring must be put in place and implemented in such a way that as soon as pollution incidents occur or negative environmental trends are noticed rehabilitation will kick in.

### **3.4 WETLAND ASSESSMENT**

#### **3.4.1 Findings**

Site A has 227 ha of wetland within the direct footprint of the proposed ADF, consisting of the upper reaches of the Klipfonteinspruit. 17.9 ha of these wetlands are in PES categories A and B, all being small hillslope seepage wetlands. No Red Data species were confirmed on site, though species such as the African Grass Owl are expected to occur within all of the sites.

The site is located more than 3.8 km from the Wilge River as the crow flies, and 7 km along the Klipfonteinspruit. This 7 km of wetland could act as a buffer to the Wilge River in terms of water quality deterioration. Site A will also require a short conveyor route, with two crossings over the Klipfonteinspruit along a reach that will be heavily impacted.

The entire site is located within a single sub-catchment and drains towards a single point. This will simplify water management significantly; specifically in terms of mitigating against water quality deterioration as all contaminants will drain towards a point. All pollution control dams will also be located in the same area.

A number of impacts are expected to materialise as consequence of the construction activities required for the establishment of the 60 year ash dam and the associated infrastructure (e.g. conveyor, access roads, PCD's etc.):

- Loss of wetland habitat;
- Disturbance to wetland habitat;
- Increased sediment transport into wetlands;
- Increased erosion within adjacent wetlands;
- Water quality deterioration in adjacent wetlands and water resources;
- Loss of Red Data and protected species;
- Increase in alien vegetation;
- Altered flows within wetlands crossed by the conveyor;
- Water quality deterioration due to seepage out of the ADF;
- Decreased flow within adjacent wetlands;
- Water quality deterioration due to ash dust from the ADF and conveyor.

### **3.4.2 Conclusions and recommendations**

Based on the impact assessment undertaken for site A, the main concerns are as follows:

- The permanent loss of 227 hectares of wetland;
- The potential deterioration in water quality within the Klipfonteinspruit and the Wilge River;
- The further degradation of the wetland system associated with the Klipfonteinspruit downstream of the proposed ADF facility.

In addition to the mitigation measures recommended to address the expected impacts, the following points are highlighted:

Management and mitigation measures should be put in place along the Klipfonteinspruit to address impacts associated with all the proposed activities within the sub-catchment, i.e. the proposed 60-year ADF, the 10-year co-disposal facility and the Kusile Power Station. A detailed management plan will thus need to be developed and implemented for the Klipfonteinspruit.

Wetland offsets and rehabilitation of offsite wetlands must be investigated to compensate for the loss of wetland habitat within the site A footprint. In this regard the development and implementation of a management plan for the Klipfonteinspruit could be considered, while it is known that wetlands within the area north of the Kusile Power Station (site C) have already been identified as potential rehabilitation targets.

The required stream diversions will be permanent features of the landscape following construction of the ADF. It is therefore important that the design of the stream diversions aims to create a stable wetland habitat that will in the long term be able to perform some of the functions currently supported by the natural wetland systems that the diversion will replace, i.e. biodiversity maintenance, water quality maintenance and erosion control. Ecological considerations to enhance biodiversity support of the diversion should thus be incorporated into the design of the diversions.

## **3.5 AVIFAUNA ASSESSMENT**

### **3.5.1 Findings**

During the construction, operational and closure phase of the ADF the habitat on the site A will be transformed and fragmented which will result in a reduced species diversity and abundance of birds. These impacts will occur as a result of disturbance, vegetation clearing and excavation.

This transformation will thus effectively displace the majority of avifauna currently utilizing the proposed development area, and, depending on where the development takes place, will



result in the fragmentation of natural grassland and wetland habitat. The effect of this will be an overall reduction of species diversity and abundance in the study area.

The Blue Crane *Anthropoides paradiseus* which is one of the priority avifauna species listed in the Mpumalanga Biobase Report was recorded during the on-site surveys. Five Red Data bird species (Blue Crane, Lesser Kestrel *Falco naumanni*, Lesser Flamingo *Phoenicopterus minor*, Secretarybird *Sagittarius serpentarius* and Greater Flamingo *Phoenicopterus roseus*) which have been prioritized by the Gauteng Department of Agriculture, Conservation and Environment (GDACE) were recorded during the field surveys conducted in the area. Based on the surveys conducted and the best available information from the South African Bird Atlas Project - 17 Red Data species could potentially occur in the habitat types present in the study area.

### **3.5.2 Conclusions and recommendations**

The potential for off-setting the loss of natural grassland and wetland on site A by conserving an equivalent quantity and quality of grassland bird habitat elsewhere on the eastern Gauteng or Mpumalanga Highveld should be considered. A suitable area should be selected based on protecting largely similar habitat types.

The relevant provincial and national environmental departments should be consulted and engaged in selecting an appropriate area. Alternatively, a financial contribution towards a legitimate conservation initiative for threatened grassland avifauna could also be considered as an off-set e.g. a contribution to Birdlife South Africa.

The proposed recommendations of the Terrestrial Ecology and Wetlands Specialist Study for the Environmental Management Programme should be strictly applied to minimise the impact on the natural environment, specifically on the remaining wetlands and natural grasslands, as this is the most important bird habitat types in the study area.

Maximum use should be made of existing infrastructure (e.g. access roads) to minimise the further fragmentation of natural grassland and wetland areas.

## **3.6 BAT ASSESSMENT**

### **3.6.1 Findings**

Seventeen insectivorous bats occur permanently or infrequently within a radius of 20 kilometres of the Kusile Power Station. Some of these species are common; others are ranked as Red Data species. Fruit bats are naturally absent.

The remaining indigenous grasslands within 15-20 km from the Kusile plant provide habitat, refuge and nourishment for invertebrates which, when they become airborne, provide prey

subsistence for insectivorous bats higher up in the food chain. This ecological event is obviously seasonal when insect reproduction ceases and bats enter torpor / hibernation.

Bodies of water and wetlands invariably support airborne insect swarms during wind-still summer dusks. Within the 20 kilometers radius from the Kusile plant the Wilge River, streams, drainage lines with aquatic vegetation and wetlands are therefore identified as ecological highly sensitive systems.

All the bats occurring in the Kusile area are native to SA and generally do not benefit from alien plants. However, infrequently some rely on exotic trees for roosts, therefore mature alien trees are weighed as of neutral importance and reducing aliens will have no direct effect on bats.

The following direct and indirect impacts have been considered:

- Loss of ecological sensitive and important indigenous vegetation units;
- Loss of ecosystem function (e.g. reduction in water quality, soil pollution);
- Loss of bat habitat;
- Loss/displacement of threatened or protected fauna.

### **3.6.2 Conclusions and recommendations**

The footprint and height of the ADF will deprive aerial insects and hawking airspace for bats. This is of little consequence and can be off-set. The physical effect of the ADF can be mitigated by provided artificial roosting sites such as making structural alterations to new buildings, erecting bat hotels, and construct artificial caves by extending culverts under roads. Bats can also be enticed away from ecologically precarious areas.

Bats are sensitive indicator species therefore it is suggested that two bat surveys are conducted annually during summer to monitor for abnormal population deviations which will signal ecological distress.

It is concluded that site A will not directly impact on the 2013 status quo of species richness and specific population dynamics, conditional to 100% containment of chemical contamination and minimizing the destruction of existing life-support opportunities (grasslands, roosting sites). Should there be unforeseen adverse environmental effects as result of the ash disposal facility, local bats will be displaced.

### 3.7 TERRESTRIAL ECOLOGY ASSESSMENT

#### 3.7.1 Findings

The study area identified seven vegetation communities, comprising three anthropogenically transformed units and four natural communities. The transformed units includes cultivated land, *Eragrostis* pastures and exotic woodlots. These units are highly disturbed and are of low ecological integrity and conservation importance. The four natural communities include Dry mixed grassland, Moist grass and sedge community, *Acacia karroo* – *Acacia caffra* thickets and the Rocky scarp vegetation community. All of the vegetation types provide important habitat for fauna and flora - a number of which are Red Data/protected species. The natural areas also form part of a larger habitat network linked to the Wilge River. Plant species of conservation importance recorded in the study area include *Boophane disticha*, *Crinum bulbispermum*, *Hypoxis* sp. and *Gladiolus* sp.

Two Red Data/protected mammal species, namely the Aardvark (*Orycteropus afer*) and Cape clawless otter (*Aonyx capensis*) have been recorded in the study area, while 21 Red Data and/or protected mammal species potentially occur in the study area. Greater flamingo's (*Phoenicopterus ruber*) were recorded in a pan immediately adjacent to Site B in the study area during the 2013 field survey.

Seventeen species of herpetofauna have been recorded in the study area and its immediate surrounds. These include ten reptile and seven amphibian species. All recorded species are common and not restricted in terms range or habitat.

Ninety five arthropod taxa have been recorded in, and/or adjacent to the study area. These are all common and widespread species. The Marsh sylph (*Metisella meninx*) has a high probability of occurring in the study area and is listed as Vulnerable. Other arthropods of conservation importance that potentially occur in the study area include members of the CTENIZIDAE (trapdoor spiders) and THERAPHOSIDAE families (Baboon spiders), and scorpion species *Opistacanthus validus* and *Opisthophthalmus glabrifrons*.

Primary impacts that have been identified for the preferred site include:

- Habitat loss and degradation through vegetation clearing; and
- Habitat fragmentation through loss of habitat and erection of artificial barriers (fences, conveyors, roads etc.).

While secondary impacts include:

- Increase in erosion and possible sedimentation of drainage features;
- Increased dust generation;
- Increased exotic and/or declared Category 1, 2 & 3 invader species;
- Killing or injuring of fauna in the study area ;

- Loss of species of conservation importance.

### **3.7.2 Conclusions and recommendations**

Large portions of land immediately surrounding Site A are already transformed or will be transformed in the near future. Kusile Power station and its associated facilities have transformed the land to the north, while the proposed New Largo above-ground mining operation will transform the land to the east of Site A. From a terrestrial perspective, the possible development of Site A will expand this cumulative transformation footprint around Kusile Power Station.

Considering the nature of the proposed project, mitigating habitat loss is difficult as vegetation clearing is inevitable. Measures that can be implemented include prohibiting vegetation clearing outside of the immediate development footprint, and where possible, avoiding clearing in areas designated as sensitive or of conservation importance. The proposed conveyor will be a major cause of habitat fragmentation. The conveyor corridor from Kusile Power Station to Site A will be routed along an existing tarred road and will be approximately 3 km long. Although it crosses a wetland, a large portion of the land between the power station and Site A is already transformed by the existing Kusile ADF.

## **3.8 AIR QUALITY ASSESSMENT**

### **3.8.1 Findings**

The current sources of particulate emissions in the vicinity include mining, other power stations and agriculture. The Kusile Power Station falls within the Highveld Priority Area, near to the Emalahleni Hot Spot. The Emalahleni Hot Spot is an area of already poor air quality where the NAAQS for daily PM<sub>10</sub> concentrations are frequently exceeded.

The modelling of the impact to air quality included four scenarios, with respect to wind—blown dust emissions from the ash disposal facility: (1) unmitigated emissions; (2) mitigation through re-vegetation (to 80% of the facility area); (3) mitigation through wetting of surface layer of exposed ash (assuming a moisture content of 5%); and, (4) mitigation through both re-vegetation and wetting.

The model output shows that in the unmitigated scenario annual PM<sub>10</sub> concentrations exceed the NAAQS well beyond the boundary of each of the investigated alternative. A similar pattern is evident for annual PM<sub>2.5</sub> concentrations. Dust-fall rates exceeding 400 mg.m<sup>-2</sup>.day<sup>-1</sup> affect an area less than 20 000 ha for the preferred site A for the unmitigated scenario.

The life-time increased cancer risk was calculated at each of the identified sensitive receptors for exposure to inhalable arsenic, nickel and chromium. The calculations were based on the projected annual PM<sub>10</sub> concentrations at each sensitive receptor, literature

values for the proportion of the toxic forms of the trace metals in coal fly ash in combination with total trace metal concentrations in a sample of ash from Kendal Power station and the US-EPA IRIS Unit [cancer] Risk Factor for exposure via inhalation. These calculations showed that the increased life-time cancer risk was low to very low.

All assessments for site selection were based on the output from the unmitigated scenario. However the findings from modelling the mitigation scenarios were included to illustrate the value in effective mitigation of wind-blown dust emissions to reduce the impact of the ash disposal facilities. Mitigation using re-vegetation was more effective in controlling wind-blown dust emissions than only watering; however, the combination of both re-vegetation and watering was the most effective. Using either re-vegetation or a combination of re-vegetation and watering will reduce particulate concentrations to levels, off-site, that comply with NAAQS.

### **3.8.2 Conclusions and recommendations**

Operational phase is considered to be the phase with the largest impact on the ambient air quality. The Construction, Closure and Post-closure phases will not impact the ambient air quality more than the status quo situation. All impacts are determined based on the results from dispersion modelling where the certainty of impacts are considered probable.

The residual impact of the ash disposal facility with frequent watering and progressive re-vegetation of the exposed areas the impact of the ash disposal facility is predicted to reduce substantially. The impacts are reduced to within NAAQS, even on-site. The impacts are thus, similar to the status quo impacts.

## **3.9 NOISE ASSESSMENT**

### **3.9.1 Findings**

The most notable sources of intrusive noise in the study area include Kusile Power Station and national/regional roads. Kusile Power Station will affect environmental noise levels in the vicinity of site A most notably.

The preferred site A are surrounded by several farmsteads and residences, with some as close as a 100 m from the footprint/laydown areas and overland conveyor routes. These are likely to be most affected by disposal activities. The towns of Ogies, Phola and Bronkhorstspuit are too far away to be affected by noise generated by the ash disposal activities. Noise measurements were conducted at three representative baseline locations around Site A.

The most significant sources of noise associated with ash include conveyor transfer and ash stacking. The following routine sources of noise therefore include the bottom and top ash stacker, conveyor transfer houses, and Overland conveying.

Predicted day-time noise levels indicate that the day-time guideline of 55 dBA considered acceptable for residences is exceeded up to ~100 m from these sources. A 5 dBA increase in day-time noise level above the baseline of 47.4 dBA (shown in Figure 5) can be expected up to 150 m from areas of operation. At an increase of 5 dBA 'little' community reaction with 'sporadic' complaints may be expected.

Predicted night-time noise levels indicate that the night-time guideline of 45 dBA considered acceptable for residences is exceeded up to ~375 m from the ash disposal facility and ~750 m from the overland conveyor. A 5 dBA increase in night-time noise level above the baseline of 37.4 dBA can be expected up to 500 m from the ash disposal area and 1150 m from the conveyor. At an increase of 5 dBA 'little' community reaction with 'sporadic' complaints may be expected.

### **3.9.2 Conclusions and recommendations**

During the construction and closure phases of the ash disposal facility, residual noise impacts are considered low in magnitude, limited to the isolated areas of construction, short in duration and could occur, resulting in a negative very low impact risk. Operational phase impacts are considered low in magnitude, limited to the study area, of medium duration (project life) and could occur, resulting in a negative low impact risk. Therefore, from an environmental noise impact perspective the preferred site A is not considered 'fatally flawed'.

## **3.10 SOIL ASSESSMENT**

### **3.10.1 Findings**

With a substantial amount of construction having been undertaken to date at the power station, and with the large footprint that will be impacted by the New largo mining venture that will supply the Eskom Kusile Power Plant with its coal, significant and large areas of ground/land in and around the study site have already been impacted and the soils disturbed.

All of the soils mapped are sensitive to erosion and compaction to varying degrees and, although tempered by the relative flatness of the terrain, they will need a well formulated management plan and adequate engineering if the soils are exposed and disturbed. The low levels of organic carbon and relatively low nutrient stores noted for many of the soils will also require that a sound management plan is adopted based on the best impact assessment information.

The materials range from well-developed in-situ derived sandy and silty loams associated with the sedimentary lithologies to clay rich and well-structured sandy clays and clay loams associated with the more basic intrusive lithological units. These are contrasted with the more recent colluvial and alluvial derived soils that return less well defined pedogenesis and comprise a range of structure and texture.

Potential impacts during the construction and operation phase will potentially could include:

- The sterilization of the soil resource on which the facilities are constructed;
- The creation of dust and the possible loss (erosion) of utilisable soil down-wind and/or downstream, and the potential for contamination of the soils from dust fallout and overland flow of dirty water;
- The compaction of the in-situ and stored soils and the potential loss of utilisable materials from the system;
- The contamination of the soils by dirty water run-off and or spillage of hydrocarbons from vehicle and machinery or from dust and emissions from the process;
- Contamination of soils by use of dirty water for road wetting (dust suppression) and irrigation of the stockpile vegetation;
- Potential contamination of soils by chemical spills of reagents being transported to site;
- Sterilization and loss of soil nutrient pool, organic carbon stores and fertility of stored soils; and
- Impact on soil structure and soil water balance.

### **3.10.2 Conclusions and recommendations**

The loss of the utilization of the soil resource will negatively impact the land use practice of low to moderate intensity livestock grazing and commercial cultivation of cereal crops (major land use activities) being undertaken on the dryland soils at present. These activities are perceived to be of great economic benefit to the local economy and land owners and contribute to the ecosystem services. However, with management, the loss, degree of contamination, compaction and erosion of this resource can be mitigated and reduced to a level that is more acceptable.

In the un-managed scenario these activities will probably result in a moderate to high negative significance that will affect the development footprint and adjacent sites for the medium to long term. It is inevitable that some of the soils will be lost during the operational phase if they are not well managed and a mitigation plan is not made part of the general management schedule. The impacts on the soils during the operational phase (stockpiled, peripheral soils and downstream materials) may be mitigated with well initiated management procedures. The proposed mitigation measures will probably reduce the negative impact on the utilisable soil reserves to a significance rating of moderate low in the medium term.

## **3.11 HERITAGE ASSESSMENT**

### **3.11.1 Findings**

Four cemeteries consisting of 47 graves in total, were identified in the study area and preferred site A. The cemeteries contain African farmworker graves. It is likely that some of the graves will be 60 years or older and thus protected under Section 36 of the NHRA. The remains of a recent farmhouse and farm workers housing were also identified. Most of the

graves had informal mounds of packed rocks as dressing and some of them had inscribed cement headstones. The graves were all overgrown with grass and other vegetation and were not maintained. Some of the graves were also damaged.

During the construction of the ash ADF, access roads, pipelines, trenches / channels, power lines re-routing, and installation of the barrier system impacts will occur to the identified and chance find heritage resources. These impacts will occur as a result of construction activities such as topsoil stripping, excavations and vegetation clearing. The most notable impacts will be on the existing cemeteries and the palaeontological sensitive substrata in the south western section of the study area.

### **3.11.2 Conclusions and recommendations**

The impact to heritage resources will be permanent as heritage resources cannot be restored. The proposed mitigation measures will enable the documentation of any palaeontology found and the preservation of human remains through the relocation to cemeteries as requested by the next-of-kin.

Where redesign of the foot print area or realignment of the conveyor alignments are not possible recommendations made the heritage specialist with regards to the heritages resources that may be impacted must be followed. For the sites where homestead remains were identified, the possibility of finding still born burials exists and any such burials uncovered should be included in the grave relocation process. It is also recommended that graves identified within the proposed development footprint be relocated after a full grave relocation process has been undertaken, which includes comprehensive social consultation. Furthermore, if excavations uncover the Vryheid Formation bedrock a Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint. A palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist and a Phase 2 report must be compiled and submitted to the responsible Heritage Authority after palaeontological construction inputs.

## **3.12 SOCIAL ASSESSMENT**

### **3.12.1 Findings**

Processes that would likely impact the social environment within and adjacent to the proposed ADF development include in-migration of people, presence of temporary workers, resettlement of businesses, conversion of economic activities and land use and impoverishment.

The area is already experiencing an in-migration of people as a result of new developments such as the Kusile power station, the New Largo mine and other developments in the area. Farm workers are supplying accommodation to workers for an additional income, while



people in Kendal Forest Holdings are also providing accommodation to contractors, putting additional pressure on infrastructure. Impacts that are currently experienced as a result of the in-migration of people is pressure on physical infrastructure (especially in Phola), an increase in crime and a change in the quality of the living environment, such as an increase in dust, noise and traffic. The commercial farmers have indicated that dust has an impact on the quality of their crops as well as their livestock. They already had to start adding lime to the ground to counter existing impacts from dust. The Bravo Cooperative as well as some farmers has reported that the noise from the construction of the Kusile power station is such a nuisance at night that it keeps them awake. The commercial farmers also have concerns about the quality of their water. Currently their water is of a fairly good quality, but they have concerns about the future.

Many of the farmers are experiencing uncertainty about the future as they are subjected to several EIA processes investigating different portions of their property. This creates uncertainty when it comes to future planning and how to proceed forward with their farming practices. They are also experiencing a loss of authority as in theory it is their choice to stay, but in practice moving away is not that simple, as land in the area is scarce and they may not find another piece of similar quality at a similar price. They are also in a position where it would be very difficult for them to sell their land, as other farmers are also not keen to farm in an area with an increase in mining and power stations.

Construction impacts are much the same as many of the impacts currently occurring in the area. Construction of the project will lead to an increase in dust in the area, noise and an increase in traffic. An increase in dust will have an impact on livestock, crops as well as the health and well-being of humans. The aesthetic quality and sense of place of the area will change as a result of the visual presence of the ash disposal facility. The construction phase will further lead to an increase in the number of available temporary job opportunities in the area. People from the Bravo Cooperative expect to benefit from the job opportunities, as do people from Phola. Residents from Phola felt that they were excluded from jobs during the construction of the Kusile power station although they were the nearest community because they were in a different municipal area.

### **3.12.2 Conclusions and recommendations**

The biggest impact on the surrounding communities will be a change in the quality of affected people's living environment, with an anticipated increase in nuisance created by dust, noise, traffic (increase in commuting time) and the presence of strangers. There are concerns about the health of the community members as well as that of livestock and crops. Pressure on physical and social infrastructure is also a concern, but it is anticipated that the project's contribution to this pressure would be quite small. Most of the impacts can to some extent be managed.

Most of the impacts mentioned cannot be reversed through mitigation measures, but through effective mitigation measures, their impacts can be managed. It is very important that

mitigation measures must be implemented consistently and according to the ways prescribed. The identified impacts will still be there, but to a lesser extent. With mitigation, the impacts will possibly be of a LOW negative significance, with effects experienced on a local level. The impact is very likely to happen and may extend beyond the life of the operation. The impact risk is thus moderately-low.

### **3.13 VISUAL ASSESSMENT**

#### **3.13.1 Findings**

The landscape is characterised by an undulating topography in the east growing more mountainous towards the west. A couple of small kopies occur randomly within the study area. Various perennial and no-perennial streams interweave through the study area. Grassland is also associated with wetlands and water bodies that speckle the study area. The sense of place was determined to be mixed industrial / pastoral.

The severity of visual impact had been rated as moderate. The Project would be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape. Construction of the Kusile Power Station would have been completed and the station fully operational by the time of the implementation of the ash disposal facility. The Project would in most instances be viewed against a backdrop including the Kusile Power Station.

#### **3.13.2 Conclusions and recommendations**

The Significance of the Construction and Operational Phases, both prior to and after the correct and effective application of mitigation measures, was rated as high. This is due to the fact that residents and travellers will still be able to see the construction and operational activities due to the landscape character and height of structures. Mitigation will only partially obstruct views, while the body of the facility would remain after the operational life time. However it can be rehabilitated to blend in with the natural environmental setting to reduce the contrast between the facility and the surrounding landscape character, thus reducing the significance only slightly.

It should however be noted that after the life time of the power station, it may be disassembled and demolished thus reducing the negative visual impact. The ash disposal facility however, would remain on site after its operational life has been completed. This dump will then become part of the characteristics of the landscape. It is therefore very important that the ash disposal facility should be rehabilitated in a way that would be best fitting into the natural (undisturbed) features of the environmental setting at the end of the operational life of the facility.

Even though mitigation measures would not result in a lower Significance rating, the client is still encouraged to implement these measures to the best practice as it would definitely

result in a lower severity of the visual impact on the affected high sensitivity locations, farmsteads and residences, within the study area.

### **3.14 TRAFFIC ASSESSMENT**

#### **3.14.1 Findings**

Traffic during the construction phase relates directly to the traffic expected during the construction of the liner or foundation of the ash disposal facility that will take place over a period of 24 months. The construction traffic will dissipate shortly after completion of construction of the liner or foundation.

The background traffic on the roads adjacent to Site A is low to average and the trip generation is not expected to result in additional delays at intersections. This development will have very low impact risk on the road network and surrounding intersections. Clay material is available on site, which means the impact due to earth moving will be limited to the development footprint. The transportation of staff to and from site will have minimum impact on the road network. The development's post construction traffic will be significantly lower than that of the construction phase.

#### **3.14.2 Conclusions and recommendations**

Site A was selected as a suitable site for the development and will gain access off Kusile Road. The access will be stop controlled and served by one lane in and one lane out. It is proposed that a pointsman be deployed during the PM Peak (15:00 – 18:00) at both the Kusile Power Station access and New Largo access during the construction phase of these two developments and also during the construction period of the proposed Ash Disposal Facility. No mitigation measure is required once the development is operational. Clay material is available on site, which means the impact due to earth moving will be limited to the development footprint. The transportation of staff to and from site will have minimum impact on the road network.

The construction traffic impact of the selected site will be low and will be limited to the development footprint, the duration will be short term, and could occur due to additional construction traffic on Kusile Road. The post construction traffic impact will be very low and limited to isolated sites, while the duration will be medium term (lifespan of the development), and is unlikely to occur due to less traffic on Kusile Road.

### **3.15 SUSTAINABILITY / COST-BENEFIT ANALYSIS**

#### **3.15.1 Findings**

Wetland habitat in the Wilge catchment (a tributary of the Olifants River) is important because it is a component of the ecological infrastructure comprising the aquatic ecosystem

of the Olifants River Catchment. DWA (2012) estimated that the value of aquatic ecosystem services (within which wetland ecological infrastructure plays an important role) was approximately R3 billion per year. Moreover, more than 55% of the GDP contributing sectors in the Olifants River Catchment are directly dependent on water use licences. The economy and people of the Olifants River Catchment are thus highly dependent upon the water resources of the catchment.

A cost-benefit analysis (CBA) is useful for ensuring a balanced perspective and prioritised analysis of projects with multiple direct and indirect benefits and costs. The direct benefit is to provide Eskom Kusile with an Ash Disposal Facility (ADF) site upon which to dispose ash produced during the coal-firing process. The Kusile Power Station will not be able to operate without this disposal site. Thus the indirect benefit of the ADF is to provide power generation capacity to the South African power generation grid. This has significant national benefit. In a CBA, these benefits come at financial and economic costs. The financial costs are those costs incurred by Eskom, during the construction and operations of the ADF. The economic costs are those that are borne by society.

The major cost components associated with development of the ADF and associated infrastructure are:

- The construction capital costs associated with the lining system (on average = 37%),
- The conveyor costs (on average = 14%),
- ADF rehabilitation costs (on average = 16%), and
- Operations and maintenance costs (on average = 22%).

These costs together comprise (on average for all Alternatives) 89% of the total capital and operational costs. Therefore the most desirable Alternative from a financial perspective would be the Alternative with:

- The smallest footprint area (i.e. lowest construction capital cost and rehabilitation cost), and
- The shortest conveyor lengths (i.e. located closest to the Kusile Power Station) (this would also have the lowest operational costs).

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## **4 ROLES AND RESPONSIBILITIES**

### **4.1 CONTRACTUAL OBLIGATIONS**

In order to ensure that this EMPr and/or derivatives thereof are enforced and implemented, these documents must be given legal and contractual standing. This shall be achieved through incorporating the EMPr and/or derivatives documents as an addendum to the contract documents for the particular project and specifying under particular conditions of the contract for the tender that the requirements of this EMPr and/or derivatives apply and must be met. This will ensure that the obligations are clearly communicated to contractors and that submitted tenders have taken into account, and budgeted for the environmental requirements specified in this EMPr and/or its derivatives. The successful tender ultimately becomes the signed contract, thereby ensuring that the included EMPr becomes legally binding.

### **4.2 RESPONSIBILITIES AND DUTIES**

#### **4.2.1 Developer (D)**

Eskom is the Developer and has overall responsibility for ensuring that the construction and development of the project is undertaken in an environmentally sound and responsible manner, and in particular, reflects the requirements and specifications of the EMPr and recommendations from the relevant authorities.

The responsibilities of the Developer will include:

- Appoint or designate a suitably qualified Project Manager to manage the implementation of the proposed project;
- Establish and maintain regular and proactive communications with the designated/appointed PM, Contractor(s) and ECO; and
- Ensure that the EMPr is reviewed and updated as necessary.

Reporting Structure:

The developer will liaise with and/or take instruction from the following:

- Authorities; and
- General Public.

#### **4.2.2 Project Manager (PM)**

The primary role of the PM is to ensure that the Contractor and Developer's staff complies with the environmental specifications in the EMPr.

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The PM shall:

- Oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications; and
- Liaise between and with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.
- Designate or appoint a suitably qualified Environmental Manager (EM) that will manage all environmental aspects on behalf of the PM and the Developer
- Review and approve Method Statements produced by the Contractor in connection with the EMPr;
- Assume overall responsibility for the effective implementation and administration of the EMPr;
- Be familiar with the contents of the EMPr, and his role and responsibilities as defined therein;
- Ensure that the EMPr is included in the Contractor's contract;
- Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports;
- In conjunction with the Construction Supervisor; undertake regular inspections of the Contractor's site as well as the installation works in order to check for compliance with the EMPr in terms of the specifications outlined therein. Inspections shall take place at least once a week and copies of the monitoring checklist contained in the file;
- Review and approve drawings produced by the Contractor or professional team in connection with, for example, the construction site layout, access/haul roads, etc.;
- Issue site instructions giving effect to the ECO requirements where necessary;
- Keep a register of all complaints and incidents (spills, injuries, complaints, legal transgressions, etc.) and other documentation related to the EMPr;
- Report to the ECO any problems (or complaints) which cannot first be resolved in co-operation with the Contractor(s);
- Implement recommendations of inspections and audits;
- Implement Temporary Work Stoppages as advised by the ECO, where serious environmental infringements and non-compliances have occurred;
- Facilitate proactive communication between all role-players in the interests of effective environmental management; and
- Ensure that construction staff is trained in accordance with requirements of the EMPr.

Reporting Structure:

The PM will report to the Developer, as and when required.

**4.2.3 Responsibilities of the Eskom Environmental Manager (EM)**

The appointed Eskom SOC Limited EM will be required to, in conjunction with the Contractor, undertake regular inspections of the Contractor's site as well as the installation works in order to check for compliance with the EMPr in terms of the specifications outlined

therein. Inspections shall take place at least once a week and copies of the monitoring checklist contained in the file. The EM will also be responsible for managing all environmental aspects on behalf of the PM and the Developer

#### **4.2.4 Contractor (C)**

The Developer, or PM acting on his behalf, will appoint a Contractor(s) to implement the development. The Contractor(s) will be contractually required to undertake their activities in an environmentally responsible manner, as described in this EMPr.

The role of the Contractor shall be to:

- Ensure that the environmental specifications of this document (including any revisions, additions or amendments) are effectively implemented. This includes the on-site implementation of steps to mitigate environmental impacts;
- Preserve the natural environment by limiting any destructive actions on site;
- Ensure that suitable records are kept and that the appropriate documentation is available to the PM;
- Take into consideration the legal rights of the individual Landowner, Communities and Eskom Regional staff;
- Ensure quality in all work done, technical and environmental;
- Underwrite Eskom's Environmental Policy at all times, and
- Ensure that all subcontractors and other workers appointed by the Contractor are complying with and implementing the EMPr during the duration of their specific contracts.

The responsibilities of the Contractor will be to:

- Discuss implementation of and compliance with this document with staff at routine site meetings;
- Designate, appoint and/or assign tasks to personnel who will be responsible for managing all or parts of the EMPr. The Contractor must appoint or designate a Safety, Health, Environment and Quality Officer (SHEQO) to monitor daily implementation of the EMPr on the Contractor's behalf as a minimum;
- Monitor environmental performance and conformance with the specifications contained in this document during site inspections;
- Report progress towards implementation of and non-conformances with this document at site meetings with the PM;
- Advise the PM of any incidents or emergencies on site, together with a record of action taken;
- Report and record all accidents and incidents resulting in injury or death; and
- Resolve problems and claims arising from damage immediately to ensure a smooth flow of operations.

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Reporting Structure:

The Contractor will report to the PM and ECO, as and when required.

#### **4.2.5 Safety, Health, Environment and Quality Officer (SHEQO)**

The SHEQO is responsible for managing the day-to-day on-site implementation of the Performance Specifications, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHEQO must act as liaison and advisor on all environmental and related issues, seek advice from the ECO or Environmental Manager when necessary and ensure that any complaints received from the public are duly processed and addressed and that conflicts are resolved in an acceptable manner. The SHEQO is the Contractor's Representative appointed solely for management of health, safety, environmental and quality aspects on the construction site.

The role of the SHEQO shall be to:

- Be well versed in environmental studies.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of the Performance Specifications.

#### **4.2.6 Subcontractors (SC)**

The Contractor may from time to time appoint Subcontractors.

The role of the Subcontractors shall be to:

- Perform certain services and/or provide certain products on behalf of the Contractor. The Subcontractors will be contractually required to undertake their activities in an environmentally responsible manner, as described in the EMPr; and
- Ensure environmental awareness among employees so that they are fully aware of, and understand the Environmental Specifications and the need for them.

The responsibilities of the Subcontractor will be to:

- Be familiar with the contents of the EMPr, and his role and responsibilities as defined therein;
- Comply with the Environmental Specifications in the EMPr and associated instructions issued by the Contractor to ensure compliance;



- Notify the Contractor verbally and in writing, immediately in the event of any accidental infringements of the Environmental Specifications and ensure appropriate remedial action is taken; and
- Notify the Contractor, verbally and in writing at least 10 working days in advance of any activity he/she has reason to believe may have significant adverse environmental impacts, so that mitigation measures may be implemented timely.

#### Reporting Structure:

Subcontractors will report to and receive instructions from the Main Contractor.

#### **4.2.7 Environmental Control Officer (ECO) or Waste Management Control Officer (WMCO)**

Through the PM the Developer will appoint an independent ECO / WMCO to monitor and oversee implementation of the EMPr for the proposed construction works. The ECO / WMCO is independent from the Developer, the PM and the Contractor(s). The ECO / WMCO is given authority to ensure that the EMPr is fully implemented and that appropriate actions are undertaken to address any discrepancies and non-compliances.

#### The role of the ECO / WMCO shall be to:

- Act as site 'custodian' for the implementation, integration and maintenance of the EMPr in accordance with the contractual requirements;
- Ensure successful implementation of the EMPr; and
- Ensure that the Contractor, his employees and/or Subcontractors receive the appropriate environmental awareness training prior to commencing activities.

#### The responsibilities of the ECO / WMCO will be to:

- Liaise with the PM on the level of compliance with the EMPr achieved by the Contractor on a regular basis for the duration of the contract;
- Advise the PM on the interpretation and enforcement of the Environmental Specifications (ES), including evaluation of non-compliances;
- Supply environmental information as and when required;
- Review and approve Method Statements produced by the Contractor, in conjunction with the PM;
- Demarcate particularly sensitive areas (including all No-Go areas) and to pass instructions through the PM concerning works in these areas;
- Monitor any basic physical changes to the environment as a consequence of the construction works according to an audit schedule;
- Attend regular site meetings and project steering committee meetings;

- Undertake regular monthly audits of the construction works and to generate monthly audit reports. These reports are to be forwarded to the PM who will communicate the results and conclusions with the Developer;
- Communicate frequently and openly with the Contractor and the PM to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts;
- Advise the PM on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities;
- Review complaints received and make instructions as necessary; and
- Identify and make recommendations for minor amendments to the EMPr as and when appropriate.

#### Reporting Structure:

The ECO will report to the PM, who in turn will report to the Developer.

### **4.3 TRAINING**

The EM and SHEQO shall be appropriately trained in environmental management and shall possess the skills necessary to impart environmental management skills to all personnel involved in the construction, rehabilitation and operation of the ADF, as applicable.

The PM and EM shall ensure, on behalf of Eskom and the Contractor, that the employees (including construction workers, engineers, and long-term employees) are adequately trained on the stipulations of the EMPr. Further, the EM and SHEQO shall arrange for all employees to attend an induction presentation on environmental awareness.

Where possible, training must be conducted in the language of the employees. The induction and training shall, as a minimum, include the following:

- The importance of conformance with all the specifications of the EMPr and other environmental policies and procedures;
- The significant environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the EMPr and other environmental policies and procedures;
- The potential consequences of departure from specified operating procedures; and
- The mitigation measures required to be implemented when carrying out their work activities.

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#### **4.4 COMMISSIONING OF TENDERS FOR THE PROJECT**

All tendering Contractors / Sub-contractors will be made aware of the contents of this EMPr and any penalties arising from non-compliance. Furthermore, all appointed Contractors / Sub-contractors will be required to attend the EMPr training and induction as detailed in the section above.

#### **4.5 ENVIRONMENTAL AUTHORISATION**

The ECO or WMCO shall convey the contents of this EMPr and the conditions of the Environmental Authorisation issued by the competent authorities. The ECO / WMCO shall discuss the contents in detail with the Eskom Project Manager and Contractor at a pre-construction meeting. This formal induction training is a requirement of ISO 14001 and shall be done with all main and sub-contractors. Record of the training dates, people who attended and discussion points shall be kept by the ECO / WMCO.

#### **4.6 ENVIRONMENTAL MANAGEMENT MEASURES**

The management measures documented in each of the sub-sections below have been compiled using the following information:

- Impact Assessment and mitigation measures documented in the FEIR for the Kusile 60 year ADF;
- Findings, recommendation and mitigation measures documented in the specialist studies accompanying the FEIR; and
- The standard EMPr, standards and guidelines utilised by Eskom.

In addition to the abovementioned information sources, the EMPr will be updated to include the conditions documented in the Environmental Authorisation to be received upon approval of the EIA.

## 5 ENVIRONMENTAL SPECIFICATIONS

### 5.1 MITIGATION GUIDE TO DEVELOPMENT ACTIVITIES

No	Development activity	Phase applicable	Relevant sections to consider
1	Appointment of contractor	Pre-construction	5.2.1 (A)
2	Appointment of ECO	Pre-construction	5.2.1 (B)
3	Training of contractor and site staff	Pre-construction, Construction, Operational	ALL SECTIONS
4	Implementation of pre-construction conditions stipulated in the EA issued to the holder (specialist walkdowns, search and rescue, baseline monitoring of environmental elements, Site specific EMPr, )	Pre-construction	5.2.1 (A, B, C, D, E); 5.2.3; 5.2.4; 5.2.6; 5.2.8; 5.2.9; 5.2.13; 5.2.14; 5.2.15; 5.2.17 (A, F, O) 5.2.18; 5.2.19; 5.2.21
5	Obtaining relevant permits and licences	Pre-construction	5.2.1 (C)
6	Securing the site	Construction	5.2.13; 5.2.14; 5.2.16; 5.2.17 (A, B, O); 5.2.20
7	Construction of access / maintenance roads	Construction, Operational	5.2.2; 5.2.3; 5.2.6; 5.2.9; 5.2.10; 5.2.11; 5.2.12; 5.2.13; 5.2.16; 5.2.17 (A, B, C, D, E, H, J); 5.2.19; 5.2.21
8	Establishment of site services (toilets, water points, eating areas, ect)	Construction	5.2.9; 5.2.14; 5.2.17 (A, B, C, N, O); 5.2.20
9	Establishment of site office, laydown area, workshop, and material and plant storage area	Construction	5.2.9; 5.2.14; 5.2.17 (A, B, C, E, F, G, H, I, O); 5.2.20
10	Construction of new power line and decommissioning of redundant infrastructure	Construction	5.2.1 (C, D, E); 5.2.2; 5.2.3; 5.2.6; 5.2.7; 5.2.8; 5.2.9; 5.2.13; 5.2.14; 5.2.15; 5.2.17 (A, C, E, H, L, O); 5.2.18; 5.2.20; 5.2.21
11	Site clearing and base layer preparation	Construction, Operational	5.2.1 (C, D); 5.2.2 – 5.2.6; 5.2.9 - 5.2.14; 5.2.16; 5.2.17 (A, B, C, D, E, K); 5.2.19; 5.2.20; 5.2.21
12	Stockpiling of topsoil and material	Construction, Operational	5.2.16; 5.2.17 (A, D, E, K); 5.2.18; 5.2.19; 5.2.20
13	River diversion for the Klipfonteinspruit and Holfonteinspruit	Construction	5.2.1 (C, D); 5.2.2; 5.2.3; 5.2.5; 5.2.6; 5.2.9; 5.2.11; 5.2.13; 5.2.17 (A, C, D, E, H, J, K); 5.2.19; 5.2.20; 5.2.21
14	Transportation of material (ash to the starter platform, topsoil to designated stockpile area)	Construction, Operational, Closure	5.2.10; 5.2.11; 5.2.16; 5.2.17 (E, H); 5.2.19; 5.2.20

No	Development activity	Phase applicable	Relevant sections to consider
15	Construction of conveyor platform	Construction	5.2.1 (C, E); 5.2.2; 5.2.3; 5.2.6; 5.2.9 – 5.2.14; 5.2.16; 5.2.17 (A – E, K, O); 5.2.19; 5.2.20; 5.2.21
16	Construction of a barrier system for the starter platform (year 0 – 5)	Construction	5.2.1 (C, D); 5.2.10; 5.2.11; 5.2.16; 5.2.17 (E, H, K); 5.2.18 - 5.2.20
17	Construction of clean and contaminated water separation and storage infrastructure including: PCDs, Contaminated storm water trench network; Clean storm water diversion trenches and berms; Clean storm water contour cut-off drains; Clean storm water holding dams; Clean storm water transfer drains.	Construction, Operational	5.2.1 (C, D); 5.2.16; 5.2.17 (D, E, H, I, J, K); 5.2.18 - 5.2.20
18	Construction of a barrier system (Year 6 – 60)	Construction, Operational	5.2.1 (C, D); 5.2.10; 5.2.11; 5.2.16; 5.2.17 (E, H, K); 5.2.18 - 5.2.21
19	Construction of the starter platform	Construction, Operational	5.2.10; 5.2.11; 5.2.15; 5.2.16; 5.2.17 (E, H, K); 5.2.19 - 5.2.20
20	Construction of pipelines (water transfer, dust suppression and irrigation, transporting water between the clean water holding dams and the contour drains).	Construction, Operational	5.2.1 (C, E); 5.2.10; 5.2.11; 5.2.16; 5.2.17 (A – E, K, O); 5.2.19; 5.2.20; 5.2.21
21	Operation of the ash stackers and conveyors, disposal of ash	Operational	5.2.10; 5.2.11; 5.2.16; 5.2.17 (E, G, H, K); 5.2.19; 5.2.20
22	Dust suppression	Construction, Operational	5.2.10; 5.2.17 (E, H, K); 5.2.18; 5.2.19; 5.2.20
23	Sloping and dozing of the ADF	Construction, Operational	5.2.10; 5.2.11; 5.2.15; 5.2.17 (E, H, K); 5.2.19; 5.2.20
24	Rehabilitation of the ADF	Construction, Operational, Closure	5.2.10; 5.2.15; 5.2.17 (E, H, K); 5.2.18 - 5.2.21
25	Irrigation of rehabilitated areas	Construction, Operational	5.2.3; 5.2.10; 5.2.17 (K); 5.2.18 - 5.2.21
26	Decommissioning of redundant dams	Operational, Closure	5.2.3; 5.2.6; 5.2.10; 5.2.11; 5.2.17 (E, H, K, L); 5.2.18 - 5.2.21
27	Maintenance and desilting of PCDs	Construction, Operational, Closure	5.2.11; 5.2.17 (D, E, G, K, L); 5.2.19; 5.2.20; 5.2.21
28	Monitoring	Construction, Operational, Closure, Post-closure	Chapter 6

## 5.2 MANAGEMENT AND MITIGATION MEASURES

### 5.2.1 PROJECT INITIATION AND GENERAL MANAGEMENT

Environmental Specification		Section	Component	Sub-section	Legend	
PROJECT INITIATION AND GENERAL MANAGEMENT		5.2.1	Appointment of Contractor	A	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure a reputable contractor is appointed and aware of the responsibilities in terms of the approved EMPr					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Obtain a signed agreement statement from the contractor indicating willingness to comply with the EMPr.	PC	PM, D	Approved EMPr	Signed agreement statement	Once off
2	The contractor, site agent and site staff shall attend a compulsory environmental awareness training approved by the DEA.	PC	EM, SHEQO	Environmental training material	Signed attendance register	Monthly
3	All new sub-contractors and site staff appointed during the construction and subsequent phases must attend a compulsory environmental awareness training.	C, O, CL, PCL	EM, SHEQO	Environmental training material	Signed attendance register	Monthly
4	The Contractor shall designate or appoint a suitably qualified Safety, Health, Environment and Quality Officer (SHEQO) to oversee implementation of the EMPr.	PC	C	-	-	Once off
5	The following shall be maintained on site as ‘n minimum: <ul style="list-style-type: none"><li>• Environmental authorisation and pertinent legislation;</li><li>• Relevant permits and licences;</li><li>• Approved EMPr;</li><li>• Method Statements;</li><li>• A daily site diary;</li><li>• A non-conformance register; and</li><li>• A public complaints register.</li></ul>	All phases	SHEQO, EM	Copies of the relevant documents	Documents will be in a site file that will be audited during compliance audits	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
PROJECT INITIATION AND GENERAL MANAGEMENT		5.2.1	Appointment of ECO	B	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure that all necessary legal obligations and contractual conditions have been met prior to the commencement with construction					
2	Ensure that all role players and stakeholders are aware of the pending construction activities and have received timeous notice					
3	Ensure all staff are aware of their responsibilities and are informed about environmental sensitivities and the consequences of non-conformance					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Eskom must appoint a suitably qualified Independent ECO / WMCO who would act on behalf of the applicant, monitor project compliance with the conditions of environmental authorisation, environmental legislation and the recommendations of the approved EMPr.	PC	PM	Signed appointment letter	-	Once off
2	The ECO must be appointed prior to the commencement of construction and pre-construction related activities and the authorities must be notified of such an appointment.	PC	PM	-	Documented ECO appointment notification	Once off
3	The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is handed over to Eskom by the contractor for operation.	PC	PM	-	-	Daily
4	The Contractor shall designate or appoint a suitably qualified Safety, Health, Environment and Quality Officer (SHEQO) to oversee implementation of the EMPr.	PC	C, PM	-	-	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
PROJECT INITIATION AND GENERAL MANAGEMENT		5.2.1	Documents, Permits and Training	C	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure pre-construction conditions stipulated in the Environmental Authorisation issued to the holder are adhered to.					
2	Ensure pre-construction conditions recommended through good practice standards and guidelines are complied with.					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Activity/ies may not commence within the specified amount of days of the date of signature of the authorisation.	PC	PM, C	EIR, EA	-	Once off
2	Should Eskom be notified of a suspension of the authorisation pending appeal procedures, Eskom may not commence with the activity / activities unless authorised by the minister in writing.	PC	D, PM, C	Notification letter	-	-
3	Written notice must be given to the DEA that the activity will commence as per the Environmental Authorisation (EA). Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence.	PC	D, PM	EA	Written notice	Once off
4	A copy of the EA, EIA and approved EMPr must be kept at the property where the activity will be undertaken. The authorisation must be produced to any authorised official of the DEA who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.	All phases	<u>SHEQO, EM</u>	Copies of the EA, EIA and approved EMPr	Compliance monitoring reports	Monthly
5	All relevant permits, certificates and permissions must be obtained prior to any activities commencing on site and are strictly enforced / adhered to.	PC	<u>SHEQO, EM</u>	Site walkdown	Documentation of permits issued.	Once off
6	The Contractor shall maintain a database of all relevant permits and permissions required for the contract as a whole and for pertinent activities for the duration of the contract.	PC	SHEQO, <u>EM</u>	Permits / Licences	Compliance monitoring reports	Monthly



<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
7	An environmental awareness training session for all of the Contractor's staff is required.	PC	PM, ECO	Environmental training material	Attendance register, training schedule and content.	Monthly
8	The course content for the environmental awareness training course shall be provided to the Contractor.	PC	PM, ECO	Environmental training material	-	Once off
9	The training session shall be delivered in English and at least one of the local languages of the site staff.	PC	PM, ECO	Training facilitator	Attendance register signed by facilitator	Once off

Environmental Specification		Section	Component	Sub-section	Legend	
PROJECT INITIATION AND GENERAL MANAGEMENT		5.2.1	Method statements	D	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure site activities are reviewed and approved before construction commence					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	The Contractor shall submit written Method Statements to the PM and ECO for the activities identified by the PM and/or the ECO. Method Statements indicate what will be done to comply with relevant environmental specification as set out in the EMPr.	PC	C, PM	Method statements	Letter of approval	Once off
2	Method Statements shall be submitted at least 10 working days prior to the proposed commencement of work on an activity, or as may be agreed with the PM, to allow the PM (and/or ECO) time to study and approve the method statement.	PC	C, PM	Method statements	Letter of approval	Once off
3	The Contractor shall not commence work on any activity until such time as the Method Statement has been approved in writing by the ECO and/or PM.	PC	C, PM	Method statements	Instruction to commence with construction	Once off
4	The ECO may require changes to a Method Statement if it does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the EMP or any legislation.	PC	C, PM	Method statements	Letter of approval	Once off
5	No claim for delay or additional cost incurred by the Contractor shall be entertained due to inadequacy of a Method Statement.	PC	C, PM	Approved method statements	No time extension claims	Weekly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
6	The Method Statement shall state clearly: <ul style="list-style-type: none"> <li>• Timing of activities;</li> <li>• Materials to be used;</li> <li>• Equipment and staffing requirements;</li> <li>• Proposed construction procedure designed to implement the relevant environmental specifications;</li> <li>• The system to be implemented to ensure compliance with the above; and</li> <li>• Other information deemed necessary by the ECO.</li> </ul>	PC	C, PM	-	Approved Method Statement	Once off
7	The following Method Statements shall be prepared by the Contractor for approval: <ol style="list-style-type: none"> <li>1. Contractor's SHE Officer and Fire Officer</li> <li>2. Site layout</li> <li>3. Access Routes</li> <li>4. Pollution control measures</li> <li>5. Safety considerations</li> <li>6. Emergency procedures</li> <li>7. Waste management control</li> <li>8. Storm water and erosion control</li> </ol>	PC	C, PM	-	Approved Method Statement	Once off
8	Compile construction method statements for all conveyor crossings. A wetland specialist should review these method statements.	PC	PM, Wetland specialist	Detailed design drawings	Approved Method Statement	Once off
9	The Contractor shall carry out the activities in accordance with the approved Method Statement.	C, O, CL	C, PM	Approved method statements	Compliance monitoring report	Monthly
10	Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel.	C, O, CL	C, PM	Site file	Compliance monitoring report	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
PROJECT INITIATION AND GENERAL MANAGEMENT		5.2.1	Community relations and communication	E	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure site activities are reviewed and approved before construction commence					
	Maintain good relations with Landowners and neighbours					
	Ensure effective communication with all affected stakeholders					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Information boards shall erected and maintained in the positions, quantities, designs and dimensions required by municipal specifications. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the ECO.	PC	C, PM	Information boards	Compliance monitoring report	Monthly
2	A Complaints Register must be maintained on Site. The Register shall contain contact details of complainants, the nature of the complaint, details on the complaint itself, as well as the date and time that the complaint was made and resolved.	PC	C, PM	Complaints register	Compliance monitoring report	Monthly
3	Queries and/or complaints must be responded to timeously.	PC	C, PM	Complaints register	Compliance monitoring report	Monthly
4	No verbal agreements shall be made. All agreements shall be recorded properly and all parties shall co-sign the documentation.	All phases	C, PM	Hardcopy documentation	Compliance monitoring reports	Monthly
5	Only the ECO and designated individuals from Eskom and the Contractor to liaise with landowners.	All phases	ECO, PM, C	Site notice board, Complaints register	Compliance monitoring reports	Monthly

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
6	A photographic record of access roads to be used must be taken prior to construction activities commencing.	PC	SHEQO, C, PM	Digital camera, FEIR, EMPr	Pre-construction compliance monitoring	Once off
7	Demarcate all existing infrastructure and private residences on the Site Layout Master Plans. Document condition of existing infrastructure prior to construction in a photographic record.	PC	SHEQO, C, PM	Digital camera, FEIR, EMPr	Site master plan	Once off
8	The Contractor shall under no circumstances interfere with the property of adjacent landowners	All phases	ECO, PM, C	Complaints register	Compliance monitoring reports	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
PROJECT INITIATION AND GENERAL MANAGEMENT		5.2.1	Housekeeping	F	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure that all changes affecting the construction activities, construction site and approved documentation are communicated to the regulating authority					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Where any of the applicant’s contact details change, including the name of the responsible person, the physical or postal address and/or telephonic details, the applicant must notify the DEA as soon as the new details become known to the applicant.	All phases	D, PM	Details of changes affected	DEA letter of acknowledge-ment	Monthly
2	The holder of the authorisation must notify the Department, in writing, within 48 hours if a condition of the authorisation is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.	All phases	D, PM	Details of changes affected	DEA letter of acknowledge-ment	Monthly

## 5.2.2 MANAGEMENT OF AQUATIC ECOLOGY

<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>	
<b>MANAGEMENT OF AQUATIC ECOLOGY</b>		<b>5.2.2</b>	-	-	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
<b>Primary Objective:</b>						
1	Minimise loss of wetlands within the development footprint					
2	Minimise indirect impact on wetlands adjacent to the development footprint					
3	Implement appropriate storm water management and water quality management procedures					
4	Aim to restore and maintain wetland functions, specifically flow attenuation and water quality improvement					
<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
1	Disturbance of riparian areas along the wetland areas should be minimised. Adjacent riparian areas should be cordoned off and considered no-go areas.	All phases	SHEQO, <u>EM</u>	FEIR, EMPr, Specialist reports	Compliance monitoring reports	Monthly
2	All wetland/riparian areas disturbed during construction should be rehabilitated immediately upon completion of construction.	C, O	SHEQO, <u>EM</u>	Specialist report, FEIR, EMPr	Compliance monitoring reports	Monthly
3	Install the recommended barrier system at ADF, PCD, and dirty water diversion canals.	C, O, CL, PCL	SHEQO, <u>EM</u>	Appropriate barrier design	Drawings signed by engineer	Once off
4	Diversion designs for Klipfonteinspruit and Holfonteinspruit must take into account habitat continuity, maintenance of riparian corridors for fauna, optimal habitat heterogeneity, and gradual side slopes to minimise erosion.	PC	PM	Stream diversion design	Pre-construction audit report	Once off
5	Diverted flows should be engineered to mimic the natural flows as far as possible by using uneven surfaces and/or flow retardant structures. Concentrated flows within canal-like diversions should be strictly avoided.	PC	PM	Stream diversion design	Pre-construction audit report	Once off
6	The position and design of stream crossings should follow existing roads as far as possible and cross streams perpendicular to the stream to minimise the footprint.	PC	PM	Specialist report, FEIR, EMPr	Storm water management plan	Once off
7	The conveyor should be enclosed at wetland crossings, including buffer zones, and should have adequate capacity to contain major spills.	PC, C, O	PM, C	Storm water management plan	Compliance monitoring reports	Once off

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
8	Transfers stations should be located outside of wetland areas.	PC, C, O	PM, C	Signed detail design drawings	Drawings signed by engineer	Once off
9	Ensure easy access next to the ADF and conveyor platform for maintenance or clean ups.	PC, C, O	PM, C	Signed detail design drawings	Drawings signed by engineer	Once off
10	Flow-gauging structures be incorporated into the design of the Klipfonteinspruit management plan, so that volumes and velocities can be more effectively managed.	PC, C, O	PM, C	Site master plan	Compliance monitoring reports	Monthly
11	Pollution Control dams should be designed according to strict safety requirements and should be regularly inspected for leaks, damage or maintenance requirements. Where irregularities are detected, they should be speedily remedied to avoid the risk of structural failure.	C, O, CL, PCL	PM, C	Camera	Inspections	Monthly
12	Conveyor and road crossings of wetlands should be regularly inspected for erosion, mechanical problems, leaks or spillages.	C, O, CL, PCL	PM, C	Camera	Inspections	Monthly
13	Attachment-level approach be adopted to manage the Klipfonteinspruit and Wilge River. Regular monitoring, with timeous management interventions, should ensure that wetland functions are maintained and that impacts are not being transferred to the Wilge River.	C, O, CL, PCL	PM, C, ECO	Specialist report, FEIR, EMPr	Compliance monitoring reports	Monthly



### 5.2.3 WATER AND STORM WATER MANAGEMENT

Environmental Specification		Section	Component	Sub-section	Legend	
WATER AND STORM WATER MANAGEMENT		5.2.3	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure successful storm water management procedures					
2	Ensure that impacts to surface water resources are controlled, and erosion is not present on site					
3						
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Storm water berms and trenches should be located so that all ‘clean’ water derived from the catchment upslope of the Ash Disposal Facility and soil stockpiles is diverted around it and into the downslope wetland areas.	All phases	C, PM	Detail design drawings	Compliance monitoring reports	Monthly
2	A storm water management plan should be in place prior to construction being initiated.	PC	PM	Detail design drawings	Compliance monitoring reports	Monthly
3	Install all water and storm water infrastructure strictly according to approved detail design drawings and best practice standards and guidelines.	All phases	C, PM	Detail design drawings	Compliance monitoring reports	Monthly
4	Should water be required from a water service provider, a written agreement shall be reached between the Contractor and the stakeholder/s involved.	All phases	PM, C	Written agreements	Compliance monitoring reports	Monthly
5	Should the Contractor be required to use water from a natural source, the Contractor shall supply a method statement to that effect and obtain the required permits. No construction shall take place in the wetland, streams and other river courses without the necessary water license from the Department of Water Affairs. Strict control shall be maintained and the ECO shall regularly inspect the abstraction point and methods used.	All phases	SHEQO, C, PM	WUL	Compliance monitoring reports	Monthly

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
6	Potable water to be supplied and available to all staff members.	All phases	SHEQO, C	Designated water supply points	Compliance monitoring reports	Monthly
7	Where practically possible, the major earthworks should be undertaken during the dry season (roughly from April to August) to limit erosion due to rainfall runoff.	C, O, CL	SHEQO, C, PM	Detail design drawings	Compliance monitoring reports	Monthly
8	Install sediment barriers and/or low berms along the downslope edge of cleared areas to trap sediments on site. Design of sediment barriers should be such that expected flow velocities will not damage the barriers or impair their function. Regular cleaning and maintenance of the barriers should be undertaken.	C, O	SHEQO, C, PM	Detail design drawings	Compliance monitoring reports	Monthly
9	No washing of machinery or equipment within wetlands areas adjacent to the development sites should be allowed.	All phases	SHEQO, C, PM	Site Layout Master Plan	Inspections	Daily

## 5.2.4 MANAGEMENT OF GROUNDWATER RESOURCES

<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>	
<b>MANAGEMENT OF GROUNDWATER RESOURCES</b>		<b>5.2.4</b>	-	-	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
<b>Primary Objective:</b>						
1	Prevent or minimise groundwater pollution					
2	Compliance of groundwater quality reserve					
3	Compliance of groundwater quantity reserve					
4	Minimise infiltration of oxygen rich water and direct oxygen exposure of the ADF					
<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
1	A groundwater monitoring network should be installed before the starting of any construction activities on site	PC	PM	Detail design drawings	Pre-construction Compliance monitoring	Monthly
2	Detailed groundwater baseline characterisation and modelling has been conducted, however additional studies will still need to be conducted to understand the link between surface and groundwater, and for the design of the pumping well field for mitigation actions.	PC	PM	Pumping system	Groundwater investigation equipment	Once off
3	Where abstraction of groundwater becomes necessary, water removed from underground could be re-injected into the groundwater table downstream of ADF activities. Appropriate monitoring of such water quality should be taken to ensure that the quality complies with groundwater quality reserve.	All phases	SHEQO, <u>EM</u>	Pumping system	Groundwater monitoring reports	Monthly
4	If the <u>abstracted</u> groundwater is contaminated, treatment needs to take place to ensure that the quality of the re-injected water complies with the groundwater quality reserve as required by DWA.	All phases	SHEQO, <u>EM</u>	Groundwater treatment system	Compliance monitoring reports	Monthly
5	The drilling of any observation or pumping well shall ensure consistent, effective and safe performance of the well.	All phases	SHEQO, <u>EM</u>	Drilling equipment / plant	Compliance monitoring reports	Monthly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
6	All newly drilled or existing pumping wells used must be equipped with flow metering devices to quantify water removed and recording should be continuous. The pumping flow rate from existing boreholes shall also be measured and recorded.	All phases	SHEQO, <u>EM</u>	WUL, flow meters	Compliance monitoring reports	Monthly
7	Calibration certificates of water flow metering devices needs to be obtained and be submitted to the appropriate authority after it has been installed and at regular intervals (2 years).	All phases	SHEQO, <u>EM</u> , C	Certified service provider	Calibration certificates	Monthly
8	Groundwater analysis shall be carried out by SANAS approved service providers and in accordance with the methods prescribed by the South African Bureau of Standards, in terms of the Standards Act 340 of 1982. The analysis methods shall not be changed without prior written approval.	All phases	SHEQO, <u>EM</u>	SANAS approved service provider	Compliance monitoring reports	Monthly
9	Monitoring frequency, analysis methods and sampling points shall not be changed without prior written approval.	All phases	SHEQO, <u>EM</u>	EMPr, Groundwater specialist report	Compliance monitoring reports	Monthly
10	During all phases of the project groundwater levels and quality shall be monitored .	C, O, CL, PCL	PM, C, service provider	Monitoring equipment	Groundwater monitoring reports	As required
11	Any leak, or failure of pollution control dams, and/or trenches should be reported to DWA and repaired according the DWA minimum requirements.	C, O, CL, PCL	PM, C, service provider		Groundwater monitoring reports	As required
12	Treatment of any contaminated groundwater resources shall be undertaken in the following order (See groundwater specialist report in Appendix F for details): 1. Natural flushing and intensive monitoring of groundwater resources; 2. In situ bioremediation or biotransformation of contaminants; 3. In-situ Chemical Oxidation Reduction (ISCOR), i.e. transfer of electrons between species; 4. Electrokinetic barriers; 5. Permeable Reactive Barriers (PRB); 6. Pump, treat and reuse.	C, O, CL, PCL	PM, C, service provider	Treatment material / systems	Groundwater monitoring reports	As required
13	Undertake internal and external groundwater and surface water use license auditing.	C, O, CL, PCL	PM, Independent auditor	WUL, EMPr	Audit report	Annual

## 5.2.5 RIVER DIVERSION MANAGEMENT

<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>	
<b>RIVER DIVERSION MANAGEMENT</b>		<b>5.2.5</b>	-	-	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
<b>Primary Objective:</b>						
1	Ensure successful storm water management procedures					
2	Ensure design and construction of the river diversion is undertaken in an environmentally sustainable manner					
3						
<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
1	Discharge points for storm water should incorporate energy dissipaters, erosion protection, vegetated buffers and sediment traps between storm water outlets and downstream wetlands and water resources.	C, O, CL	SHEQO, C, PM	Detail design drawings	Compliance monitoring reports	Monthly
2	All discharge points should be regularly inspected for signs of erosion, sediment deposition or obstructions.	C, O, CL, PCL	SHEQO, C, PM	Detail design drawings	Compliance monitoring reports	Monthly
3	The gradient of the stream diversions should be kept as low as possible. The diversion itself should be broad with gently sloping sideslopes, and should incorporate rip rap steps (rock-packed steps) at regular intervals to protect against erosion and to allow for the required fall in the stream diversions.	C	SHEQO, C, PM	Detail design drawings	Inspections	Daily
4	Following construction activities the entire diversion floor should be landscaped to remove all obstacles and ruts that could lead to the formation of preferential flow paths.	C	SHEQO, C, PM	Detail design drawings	Inspections	Daily
5	Re-vegetation of the stream diversion floor should proceed naturally and establish rapidly (based on experience from the Goedgevonden main river diversion) if sufficient flow through the wetland is available. Should exceptionally low flows be encountered due to drought conditions, seeding of the diversion might be required to ensure rapid vegetation establishment.	C	SHEQO, C, PM	Hydro-seeding material	Inspections	Daily
6	Regular monitoring of the stream diversion will thus be required until vegetation cover has been established across the full stream diversion.	C	SHEQO, C, PM	Rehabilitation monitoring form	Compliance monitoring reports	Monthly
7	Terrestrial areas such as the sideslopes of the stream diversions may not re-vegetate naturally and should be seeded with a suitable mix of indigenous highveld grasses.	C	SHEQO, C, PM	Hydro-seeding material	Inspections	Daily

## 5.2.6 WETLAND MANAGEMENT

Environmental Specification		Section	Component	Sub-section	Legend	
WETLAND MANAGEMENT		5.2.6	-	-	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
Primary Objective:						
1	Minimise loss of wetlands within the development footprint					
2	Minimise indirect impact on wetlands adjacent to the development footprint					
3	Establish emergency response protocol					
4	Implement appropriate storm water management and water quality management procedures					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Include environmental awareness aspects into the site induction programme to ensure all staff is aware of the location and importance of wetland habitats in the vicinity of the construction site.	PC	SHEQO, <u>EM</u>	FEIR, EMPr, Heritage specialist report	Training programme, attendance register	Once off
2	Undertake a wetland offset study to investigate the possibility of mitigating the loss of wetland habitat on site A through the rehabilitation and protection of wetlands elsewhere. Such an offset should ideally be located within the same catchment. A potential target wetland for rehabilitation is the Klipfonteinspruit system downstream of the proposed ash dam site. This system already receives most of the storm water discharges from Kusile Power Station and will require management interventions as it is already on a negative trajectory of change.	PC	PM, wetland specialist	Wetland specialist study, EMPr	Wetland offset plan	Once off
3	Appoint suitably qualified professionals to undertake search and rescue operations for Red Data plant species prior to vegetation clearing activities.	PC	PM, wetland specialist	Wetland specialist study, EMPr	Wetland offset plan	Once off
4	Include Red Data species and suitable habitat in offset considerations	PC	PM, wetland specialist	Wetland specialist study, EMPr	Wetland offset plan	Once off
5	Design the stream diversion to ensure connectivity within the system is maintained.	PC	SHEQO, <u>EM</u> , C, PM	Stream diversion design	Pre-construction audit report	Once off

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
6	The stream diversion must be designed with soft structures, e.g. gabions, to allow re-establishment of fauna and flora	PC	PM	Stream diversion design	Pre-construction audit report	Once off
7	The active channel of all wetlands should be crossed through the use of a engineering structure that will maintain the integrity of the channel and allow continued flow.	PC, C, O	PM, C	Signed detail design drawings	Drawings signed by engineer	Once off
8	Design a construction storm water management plan that aims to minimise the concentration of flow and increase in flow velocity, as well as minimising sediment transport off site.	PC	PM	Specialist report, FEIR, EMPr	Storm water management plan	Once off
9	Install the construction storm water management system prior to the onset of vegetation clearing activities on the ADF footprint.	PC, C, O	PM, C	Storm water management plan	Compliance monitoring reports	Once off
10	Install sediment traps as part of the storm water management plan where necessary upstream of discharge points.	PC, C, O	PM, C	Signed detail design drawings	Drawings signed by engineer	Once off
11	Divert clean water around the cleared area and install erosion protection measures and energy dissipaters at points of discharge.	PC, C, O	<u>SHEQO, EM</u>	Signed detail design drawings	Drawings signed by engineer	Once off
12	Avoid additional wetland loss by limiting construction activities to as small an area as possible, ideally within the footprint of the proposed ash disposal facility.	PC, C, O	<u>SHEQO, EM</u>	Signed detail design drawings	Compliance monitoring reports	Monthly
13	Locate any temporary waste and hazardous substance storage facilities a minimum of 100 m from any wetland edge. <u>Appropriate licences must be obtained before this activity can commence.</u>	PC, C, O	<u>SHEQO, EM</u>	Site master plan	Compliance monitoring reports	Monthly
14	Locate ablution facilities at least 100 m from the edge of wetland areas outside the direct development footprint.	PC, C, O	<u>SHEQO, EM</u>	Site master plan	Compliance monitoring reports	Monthly
15	No construction, stockpiles, laydown areas or any other activity may take place in wetland areas. Including no vehicular traffic in wet areas / wetlands unless authorised.	C, O	<u>SHEQO, EM</u>	Specialist report, FEIR, EMPr	Compliance monitoring reports	Monthly
16	Where necessary and at the discretion of the ECO, fence off all wetland areas falling outside the direct development footprint of activities to limit impacts to these wetlands.	C, O	PM, C, ECO	Site master plan	Compliance monitoring reports	Monthly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
17	Phase vegetation clearing activities as far as possible to limit the area exposed at any one time.	C, O	SHEQO, C, PM	Site master plan	Compliance monitoring reports	Monthly
18	The gradient of the stream diversions should be kept as low as possible. The diversion itself should be broad with gently sloping sideslopes, and should incorporate rip rap steps (rock-packed steps) at regular intervals to protect against erosion and to allow for the required fall in the stream diversions.	C, O	SHEQO, C, PM	Site master plan	Compliance monitoring reports	Monthly
19	A stilling basin should be incorporated at the end of the diversion to act as attenuation structure.	PC, C, O	PM, C	Signed detail design drawings	Drawings signed by engineer	Once off
20	Where culverts are utilised to cross seepage wetlands or weakly channelled systems, sufficient culverts should be utilised to ensure wetting of the full wetland front downslope of the crossing.	PC, C, O	PM, C	Signed detail design drawings	Drawings signed by engineer	Once off
21	Gantries should be installed at all wetland crossings.	PC, C, O	PM, C	Signed detail design drawings	Drawings signed by engineer	Once off
22	All activities taking place within or within 500m of the wetlands will require a Water Use License Application.	PC, C, O	PM, C	DEIR, EMPr, wetland specialist report	Drawings signed by engineer	Once off



## 5.2.7 MANAGEMENT OF IMPACTS ON AVIFAUNA

Environmental Specification		Section	Component	Sub-section	Legend	
MANAGEMENT OF IMPACTS ON AVIFAUNA		5.2.7	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Minimise impact on existing habitat within and around the development footprint					
2	Ensure protection of avifauna species impacted by the development					
3	Implement strategies to facilitate movement of avifauna away from the development site					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Establish offsets i.e. conserve and improve suitable alternative grassland and wetland habitat in the region in order to improve and provide additional suitable habitat for impacted avifaunal species. <u>This will be undertaken as part of the wetland offsets plan.</u>	PC	PM, avifaunal specialist	FEIR, EMPr, wetland offsets guideline	Pre-construction Compliance monitoring	Once off
2	Contribute financially towards existing grassland and wetland conservation initiatives already active in the region <u>in the event that appropriate offsets cannot be established within the same catchment.</u>	PC	PM	Finance	-	Once off
3	Minimise the impact on the natural environment, specifically on the remaining wetlands and natural grasslands, as this is the most important bird habitat types in the study area.	C, O, CL, PCL	SHEQO, C, PM	FEIR, EMPr, Site layout master plan	Compliance monitoring report	Monthly
4	Maximum use should be made of existing infrastructure (e.g. access roads) to minimise the further fragmentation of natural grassland and wetland areas.	All phases	C, PM	FEIR, EMPr, Site layout master plan	Compliance monitoring report	Monthly
5	The breeding sites of raptors and other sensitive bird species shall be taken into consideration during the planning of the construction programme.	PC	SHEQO, C, PM	FEIR, EMPr, site master plan	Pre-construction Compliance monitoring	Once off
6	<u>A qualified and experienced avifauna specialist should undertake a detailed site walk down within the proposed ADF footprint and adjacent to the footprint prior to construction to identify sensitive bird areas and nests.</u>	PC	SHEQO, EM, Avifauna specialist	EMPr, site master plan	Pre-construction Compliance monitoring	Once off

<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
7	Flight diverters and/or bird flappers must be installed along identified sensitive sections of the deviated power lines, should the avifauna specialist identify such sensitive areas adjacent to the ADF footprint and within the power line servitude.	PC, C	SHEQO, EM	Flight diverters, Bird flapper, PPE	Compliance monitoring report	Monthly

## 5.2.8 MANAGEMENT OF IMPACTS ON BATS

Environmental Specification		Section	Component	Sub-section	Legend	
MANAGEMENT OF IMPACTS ON BATS		5.2.8	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Minimise impact on existing habitat within and around the development footprint					
2	Ensure protection of bat species impacted by the development					
3	Implement strategies to facilitate movement of bats away from the development site					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	A bat specialist should be appointed twice a year to monitor bat species richness and population densities using state-of-the-art bat detectors. Such monitoring should be conducted during October (prior to birth of pups), and during February (when young of the year have reached maturity).	C, O, CL, PCL	PM, bat specialist	FEIR, EMPr, Bat specialist report	Bat monitoring report	Twice a year
2	Create new roosting opportunities by constructing new buildings in such a manner that roofs offer roosting opportunities, erecting bat hotels, arrange culvert elements to simulate caves in moist areas, and avoid grazing at or near wetlands and riparian zones, if possible.	C, O, CL, PCL	PM	Construction material	Presence of bats in the area	Twice a year
3	Provide additional roosting opportunities > 5km away from the ash disposal site, where possible.	C, O, CL, PCL	PM	Construction material	Presence of bats in the area	Twice a year

4	Minimise night light at the construction site, conveyor platform and ADF to minimise attraction of bats to the area.	C, O, CL, PCL	SHEQO, C, PM	FEIR, EMPr, Bat specialist report	Compliance monitoring report	Monthly
5	Erect lighting in areas suitable for bats away from construction areas and the ADF, <u>if possible</u> . This will attract invertebrates which in turn will entice bats to this area.	All phases	SHEQO, C, PM	FEIR, EMPr, Bat specialist report	Compliance monitoring report	Monthly

## 5.2.9 MANAGEMENT OF TERRESTRIAL ECOLOGY / FLORA

Environmental Specification		Section	Component	Sub-section	Legend	
MANAGEMENT OF TERRESTRIAL ECOLOGY / FLORA		5.2.9	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Minimise impact on existing habitat within and around the development footprint					
2	Ensure protection of fauna species impacted by the development					
3	Implement strategies to facilitate movement of fauna away from the development site					
4	Prevent or minimise additional habitat fragmentation					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Appoint suitably qualified professionals to undertake search and rescue operations for Red Data plant species prior to vegetation clearing activities.	PC	PM, specialist	FEIR, EMPr, site master plan	-	Once off
2	A nursery should be established to house species of conservation significance removed during site clearing. Alternatively conservation significant species should be taken to an existing nursery to temporarily house the plants. Only species known to successfully relocate should be moved.	PC	PM	FEIR, EMPr, Site Layout Master Plan	Pre-construction Compliance monitoring	Once off

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
3	Prior to construction, all areas designated for vegetation clearing should be clearly marked and surveyed for Red Data/protected flora and fauna species. It is advised that an ECO be appointed to oversee this process.	PC	SHEQO, C	FEIR, EMPr, site master plan	Pre-construction Compliance monitoring	Once off
4	In the event that Red Data/protected flora are identified within the construction footprint and require relocation, rescue permits must be obtained from the provincial or relevant authority, and a suitable ex-situ, and/or in-situ conservation plan developed. The conservation plan must be approved and overseen by the ECO.	PC	C, PM	Specialist walk-down report	Pre-construction Compliance monitoring	Once off
5	Maximum use should be made of existing infrastructure (e.g. access roads) to minimise the further fragmentation of natural grassland and wetland areas.	PC	C, PM	FEIR, EMPr, site master plan	Pre-construction Compliance monitoring	Once off
6	Ensure that suitable fencing is erected prior to the commencement of construction to ensure that livestock does not wonder into dangerous areas.	All phases	SHEQO, C, PM	Approved method statement, Site Layout Master Plan	Compliance monitoring report	Monthly
7	Culverts should be installed at regular intervals along conveyor routes, fences and access roads to allow easy access across the barrier to prevent the obstruction of fauna dispersal and movement patterns.	All phases	SHEQO, C, PM	Approved method statement	Compliance monitoring report	Monthly
8	A low speed limited should be enforced on site to reduce wildlife-collisions.	All phases	SHEQO, C, PM	Traffic control measures	Inspections	Daily
9	Employees and contractors should be made aware of the presence of, and rules regarding fauna through suitable induction training and on-site signage.	All phases	SHEQO, C, PM	Signage and training material	Inspections	Daily

## 5.2.10 MANAGEMENT OF DUST AND AIR QUALITY IMPACTS

Environmental Specification		Section	Component	Sub-section	Legend	
MANAGEMENT OF DUST AND AIR QUALITY IMPACTS		5.2.10	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Minimise impact of dust and particulate matter fallout on adjacent properties					
2	Minimise impact of dust and particulate matter on air quality in the region					
3	Ensure compliance with ambient air quality standards					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Mechanical dust suppression and irrigation system must be implemented on the ADF and conveyor according to recommended conditions stipulated in the concept design report and final design report.	All phases	C, PM	Dust suppression system	Dust fallout results within applicable standards	Monthly
2	Dust control measures, such as watering, chemical stabilisation and the reduction of surface wind speed through the use of windbreaks and source enclosures must be put in place during construction activities.	C, O, CL	C, PM	Dust suppression system	Dust fallout results within applicable standards	Monthly
3	Dust fall monitoring must be implemented around the perimeter of the ash disposal facility and on neighbouring farms and land uses sensitive to air quality impacts, especially in the direction of the prevailing winds and near any sensitive receptors.	All phases	PM, specialist	Dust suppression system	Compliance monitoring reports	Monthly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
4	Cover exposed ash areas <u>directly behind the advancing stackers</u> with topsoil to stabilise surface ash (approximately 50 mm), <u>prior to final concurrent rehabilitation</u> .	C, O, CL	C, PM	Available topsoil	Compliance monitoring reports	Monthly
5	All temporary construction, access or gravel roads used during construction and operation must be sprayed down with a water truck on a regular basis (at least 2 times per week <u>or as required</u> ) to manage traffic generated dust.	C, O, CL	C, PM	Water bowser	Inspections	Weekly
6	Dampness of the watered ash facility <del>should</del> <u>must</u> be monitored regularly to ensure a balance is maintained between dust suppression and slumping/collapses due to excessive wetting.	C, O, CL	C, PM	Appropriate measurement equipment	Inspections	Daily
7	Dirty water runoff should first be used followed by storm water for dust suppression to avoid the need for abstraction from natural water resources.	C, O, CL	C, PM	Dust suppression system	Inspections	Weekly
8	Ash transported on the conveyor should contain sufficient moisture to minimise dust generation. Refer to air quality report for guidelines.	C, O, CL	C, PM	Appropriate measurement equipment	Inspections	Daily
9	<u>Conveyor coverings</u> should be installed along the conveyor <del>for the full extent of all wetland crossings</del> to limit ash and dust fallout into the wetlands and adjacent areas.	C, O, CL	C, PM	Detailed design drawings	Inspections	Daily
10	All topsoil stockpiles and cleared areas should be re-vegetated, covered or kept moist to prevent dust generation.	C, O, CL	C, PM	Water bowser	Inspections	Weekly
11	Monitoring of dust-fall rates (via dust bucket network) and ambient air quality (via PM10 monitoring) must be undertaken on a regular basis.	C, O, CL	C, PM	Air quality measurement equipment	Air quality audit reports	Monthly
12	The burning of substances that may emit foul smelling smoke or vapour, e.g. oil rags, tar paper etc., is not permitted.	C, O, CL	C, PM	Regular waste removal	Compliance monitoring reports	Monthly
13	<u>An emergency response plan must be developed to ensure rapid response in the event that the dust suppression and irrigation systems servicing the developing ash disposal facility fail. This emergency response procedure must contain relevant and emergency telephone numbers, risk assessment, and mobilisation procedures, at a minimum.</u>	<u>All phases</u>	<u>SHEQO, EM, PM, C</u>	<u>Emergency response plan, water tanks, bowzers</u>	<u>Incident reporting</u>	<u>As required</u>

<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
14	At least one water truck / bowser containing a full water load must be available on site at all times to ensure rapid response in the event dust suppression must be manually undertaken on the ash disposal facility. This may be in response to rapid increases in wind speed or failure of the dust suppression or irrigation systems.	All phases	SHEQO, EM, PM, C	Emergency response plan, water tanks, bowers	Incident reporting	As required

## 5.2.11 NOISE MANAGEMENT

Environmental Specification		Section	Component	Sub-section	Legend	
NOISE MANAGEMENT		5.2.11	-	-	<div><u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure that noise is managed in such a manner that no complaints are received					
2	Reduce noise generated by activities associated with the construction of the overland ash conveyor and ash disposal facility					
3						
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	During the planning and design stages of the project, possibly related noise aspects should always be kept in mind. The enclosure of major sources of noise, such transfer houses, must be included in the design process, since they represent basic good engineering practice.	PC	PM	Design drawings	Signed design drawings	Once off
2	In order to prevent noise impacts resulting from construction activities, working hours are to be limited to weekdays between <u>06h00 to 18h00</u> .	All phases	SHEQO, C, PM	EMPr	Compliance monitoring reports	Monthly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
3	If certain construction requires work outside of these hours, all adjacent landowners have to be informed prior to any construction outside of the specified hours commencing.	All phases	SHEQO, C, PM	EMPr	Proof of notification of landowners	As required
4	All mechanical and electrical equipment i.e. drive units, idlers, pulleys etc. must be regularly maintained and kept at a high level of maintenance. This must particularly include the regular inspection and, if necessary, replacement of noisy elements.	All phases	SHEQO, C, PM	Digital camera, FEIR, EMPr	Inspection checklists	Daily
5	Environmental noise level and complaint monitoring at noise sensitive receptors within 1 km of any activity.	All phases	SHEQO, C, PM	Noise monitoring equipment	Noise monitoring records	As required
6	To minimise noise generation, vendors can be required to guarantee optimised equipment design noise levels.	All phases	SHEQO, C, PM	-	Inspection checklists	Daily
7	All vibrating equipment must be installed on vibration isolating mountings.	All phases	SHEQO, C, PM	Noise monitoring equipment	Noise monitoring records	As required
8	By enclosing the tipper discharge and lowering the conveyor drop height, noise emissions may be reduced. Mechanical and electrical design also influences the amount of noise from stacking operations.	All phases	SHEQO, C, PM	Noise monitoring equipment	Noise monitoring records	As required
9	Relocate movable noise sources to less sensitive areas to take advantage of distance and shielding.	All phases	SHEQO, C, PM	Noise monitoring equipment	Noise monitoring records	As required
10	Locate noise-generating permanent facilities away from community areas if possible.	All phases	SHEQO, C, PM	Noise monitoring equipment	Noise monitoring records	As required
11	It is recommended that a noise management zone be considered around the operations. This area should correspond to the area over which noise levels may result in sporadic complaints and occasional community action that is ~1 km from operations. Complaints and noise levels in this area should be recorded and monitored and corrective actions taken communicated to interested and affected parties.	All phases	SHEQO, C, PM	Site Layout Master Plan	Noise monitoring records	Daily



<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
12	Reverse hooters of heavy earthmoving vehicles must be set at such a level that the beeping sound does not create a noise nuisance to surrounding communities.	C, O, CL	SHEQO, C, PM	-	Noise monitoring records	Daily
13	Should the PM approve any noisy construction activities outside of normal working hours, affected residents and ECO shall be notified by the Contractor at least 5 days in advance of the event.	C, O, CL	SHEQO, C, PM	After hours work schedule	Notification letter	As required

## 5.2.12 MANAGEMENT OF SOIL AND LAND CAPABILITY IMPACTS

Environmental Specification		Section	Component	Sub-section	Legend	
MANAGEMENT OF SOIL AND LAND CAPABILITY IMPACTS		5.2.12	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Remove, store and protect soils					
2	Limit area of impact					
3	Store utilizable resource and manage erosion loss and structural deformation, plus compact footprint and engineer a barrier layer					
4	Manage on-going soil stripping and storage					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Remove utilisable soils to designed depths before construction, stockpile and protect from erosion and compaction and impacts of contamination by dust or dirty water.	C, O, CL	SHEQO, C	Truck and shovel	Inspections	Weekly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
2	Stockpile soils in dumps of < 1,5 m height and or berms of less than 1,5 m.	C, O, CL	SHEQO, C, PM	TLB and tucks	Inspections	Weekly
3	Stockpile soft overburden and the non-utilisable portion of the soil horizon separately from the utilisable soils, and keep wet based soils separated from dry soil storage.	C, O, CL	SHEQO, C, PM	TLB and tucks	Compliance monitoring reports	Monthly
4	Manage soil removal during dry season were possible, with specific control on the more structured soils.	C, O, CL	SHEQO, C, PM	TLB and tucks	Compliance monitoring reports	Monthly
5	Maintain vegetative cover to all soil storage areas and on exposed faces to control erosion and reduce effects of compaction.	C, O, CL	SHEQO, C, PM	Manual labour	Compliance monitoring reports	Monthly
6	Stockpiles will be established / engineered with storm water diversion berms in place to prevent run off erosion.	C, O, CL	SHEQO, C, PM	-	Approved method statements	As required
7	Only inert waste rock material will be placed on the soil stockpiles if the vegetative growth is impractical or not viable (due to lack of water for irrigation etc.). This will aid in protecting the stockpiles from wind and water erosion until the natural vegetative cover can take effect.	C, O, CL	SHEQO, C, PM	Manual labour	Compliance monitoring reports	Monthly
8	Equipment, human and animal movement on the soil stockpiles will be limited to avoid topsoil compaction and subsequent damage to the soils and seedbank.	C, O, CL, PCL	SHEQO, C	Site Layout Master Plan	Compliance monitoring reports	Monthly
9	Regular monitoring of vegetative cover and growth, maintenance of weeds and soil testing for nutrient status.	C, O, CL, PCL	SHEQO, C	Visual assessment	Compliance monitoring reports	Quarterly monitoring, Annual Audit
10	Reinstate soils as closely as possible to their original position and in the correct order of emplacement.	O, CL, PCL	SHEQO, C, PM	TLB and tucks	Inspections	Weekly
11	Treat soils with required (analytical test results) pH balance and fertiliser requirements (lime and N : K : P requirements). Retest quarterly for first year and annually thereafter till standalone status reached.	O, CL, PCL	SHEQO, C, PM	Relevant fertilisers	Compliance monitoring reports	Quarterly monitoring, Annual Audit
12	The development area must be fenced, and all animals kept off the area until the vegetation is self-sustaining.	CL, PCL	PM	Fencing material	Compliance monitoring reports	Quarterly monitoring, Annual Audit

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
13	Newly seeded/planted areas must be protected against compaction and erosion (Vetiver hedges etc.).	CL, PCL	PM	Vetiver hedges or same	Compliance monitoring reports	Quarterly monitoring, Annual Audit
14	Plants should be watered and weeded as required on a regular and managed basis, were possible and practical.	CL, PCL	PM	Unskilled Manual labour	Compliance monitoring reports	Quarterly monitoring, Annual Audit
15	Regularly check for pests and diseases and treat if necessary.	CL, PCL	PM	Camera	Compliance monitoring reports	Bimonthly
16	Replace unhealthy or dead plant material.	CL, PCL	PM	Indigenous vegetation	Compliance monitoring reports	Quarterly monitoring, Annual Audit
17	Fertilise hydro seeded and grassed areas soon after germination.	CL, PCL	PM	Relevant fertilisers	Compliance monitoring reports	Quarterly monitoring, Annual Audit

### 5.2.13 MANAGEMENT OF HERITAGE RESOURCES

Environmental Specification		Section	Component	Sub-section	Legend
MANAGEMENT OF HERITAGE RESOURCES		5.2.13	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>
Primary Objective:					
1	Minimise impacts on heritage resources through timeous mitigation measures				
2	Protection of archaeological sites and land considered to be of cultural value.				
3	Preservation and appropriate management of new archaeological finds should these be discovered during construction				
4					

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	Develop heritage training section to include in induction programme for employees during construction.	PC	PM, C, relevant specialist	FEIR, EMPr, Heritage specialist report	Training programme, attendance register	Once off
2	Ensure all known sites of cultural, archaeological, and historical significance are demarcated on the site master plan, and marked as no-go areas.	PC	PM, C, relevant specialist	FEIR, EMPr, Heritage specialist report	Records of heritage sites, Designation as no-go areas.	Once off
3	Should any remains be found on site that is potentially human remains, the South African Police Service should also be notified. Construction activities must cease and a buffer of at least 20 m is required.	C, O	SHEQO, C, PM	-	Inspections	As required
4	Under no circumstances may any heritage material be destroyed or removed from site.	C, O	SHEQO, C, PM	-	No damage to heritage resources	As required
5	Demarcate cemeteries with 20 meter buffer during construction, until relocated.	PC	PM, C, relevant specialist	FEIR, EMPr, Heritage specialist report	Records of heritage sites	Once off
6	A Palaeontologist must be appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.	PC	PM, C, relevant specialist	FEIR, EMPr, Heritage specialist report	Records of palaeontological sites	Once off
7	A Palaeontological rescue and/or destruction permit is to be obtained by the Palaeontologist.	PC	Palaeontologist	FEIR, EMPr, Heritage specialist report	Approved permits	Once off
8	The Palaeontologist must accompany the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.	C, O	PM, C, Palaeontologist	Site Layout Master Plan	Records of palaeontological sites	Once off

<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
9	In the event palaeontological artefacts are discovered, a Phase 2 report to the Heritage Authority responsible must be compiled after palaeontological construction inputs have been completed.	C, O	PM, Palaeontologist	Records of palaeontological sites	Phase 2 HIA report	Once off
10	Historical Structures must be demarcate (i.e. sites B4, B5, B6, B10, B11 identified in the heritage report) and evaluated by a conservation architect or architectural historian to determine the significance and make further recommendations.	PC	PM, C, relevant specialist	FEIR, EMPr, Heritage specialist report	Records of historical sites	Once off

## 5.2.14 MANAGEMENT OF SOCIAL IMPACTS

Environmental Specification		Section	Component	Sub-section	Legend
MANAGEMENT OF SOCIAL IMPACTS		5.2.14	-	-	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer
<u>Primary Objective:</u>					
1	Minimise social impacts on the receiving communities				
2	Manage and minimise complaints from the public or landowners				
3	Prevent and manage claims or litigation during all phases of the ADF development				
4	Prevent damage to private property				

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	Establish or join an environmental forum to discuss water, dust and other environmental issues and involve farmers in environmental monitoring process if required.	PC	PM	Attendance register	Records of minutes	Monthly
2	Enter in a discussion with the directly affected land owners to come up with a solution in line with international standards to compensate them for the loss of property and to assist them to recreate their livelihoods, as well as the livelihoods of the dependent farm workers.	PC	PM	Attendance register	Records of minutes	Random testing.
3	Ensure that the recommendations of the relevant bio-physical studies (noise, air quality, etc) are followed to minimise impacts. Farmers suggested planting trees to absorb some of the noise and visual impact. Create a grievance mechanism to ensure nuisances can be reported and dealt with quickly.	All phases	PM, C	EMPr, Specialist studies	Compliance monitoring reports	Monthly
4	Design and implement a Drug and Alcohol Management Policy, and undertake regular testing on site, to minimise negative interactions with the local community.	All phases	PM, C	Alcohol breathalyser	Drug and alcohol management policy	Random testing.
5	Implement a Health and Safety Programme on site, including safety consciousness and awareness training. The programme should also include relevant health aspects, e.g. sexual health, fatigue management and social health.	All phases	PM, C	Health and Safety Programme	Health & Safety Programme and record of incidents.	Monthly
6	Communicate the best practice access protocol (e.g. AgriSA access protocol) to all staff that employees and contractors must follow before they access property that does not belong to Eskom.	All phases	SHEQO, C, PM	Access protocol	Complaints register	Once off
7	Make sure workers wear identification cards and vehicles can easily be identified.	All phases	SHEQO, C, PM	Access protocol and cards	Site access records	Once off
8	Create/join a community policing forum for the area with buy in from neighbours and local police.	All phases	PM	Community policing forum	Minutes of forum meeting	As required
9	Meet with local municipality to discuss the potential impact of the proposed project on their service delivery.	PC	PM	Development programme	Minutes of meetings	As required
10	Create or implement an employment and recruitment policy and communicate it to the stakeholders. Employ local people where possible.	PC	PM	Employment policy	Employment contracts	As required

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
11	Compile a community relations strategy and appoint a community liaison officer.	PC	PM	-	CLO appointment	Once off
12	Put a complaints procedure/grievance mechanism in place.	All phases	SHEQO, C, PM	-	Complaints register	Once off
13	Compile a communication strategy to regularly communicate specifically with land owners affected by alternatives and keep them up to date with developments.	All phases	SHEQO, C, PM	Land owners contact list	Proof of communication	As required
14	Put dust buckets on all neighbouring properties and monitor on a monthly basis. Give farmers access to results at environmental forum meetings.	C, O, CL, PCL	SHEQO, C, PM	Dust monitoring report	Compliance monitoring reports	Monthly
15	Encourage workforce to live in established residential areas. Provide transport from these areas to the ash disposal facility.	C, O, CL, PCL	SHEQO, C, PM	Signed transport agreements	Access control documents	Ongoing
16	Implement workforce education programs on cultural diversity and tolerance.	All phases	SHEQO, C, PM	Educational material	Minutes from training meetings	As required
17	Develop an Employee Assistance Programme to assist employees and their families in dealing with the effects of retrenchment.	CL, PCL	PM	Complete employee assistance programme	Register of alternate employment	As required
18	<del>Provide portable skills development programme for employees that will be retrenched on closure.</del>	<del>CL, PCL</del>	<del>PM</del>	<del>Complete employee assistance programme</del>	<del>Minutes from training meetings</del>	<del>As required</del>
19	<del>Provide assistance to retrenched employees in finding new employment, like time off to go for interviews, fax and e-mail services, referrals etc.</del>	<del>CL, PCL</del>	<del>PM</del>	<del>E-mail, fax facilities, Recruitment agencies</del>	<del>Register of alternate employment</del>	<del>As required</del>
20	The Contractor's staff shall in no way be a nuisance to residents or clients seeking the services of the established businesses in the area. Any complaints received by the PM will be investigated, addressed and, if deemed necessary, the relevant persons will be suspended from the project.	C, O, CL, PCL	SHEQO, C, PM	-	Complaints register	Weekly

<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
21	The Contractor shall give at least seven days notice to the residents in the vicinity of the construction activities of his intention to begin construction activities in their area.	C, O, CL, PCL	SHEQO, C, PM	Notification letter	Complaints register	Weekly

## 5.2.15 MANAGEMENT OF VISUAL IMPACTS

<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>
MANAGEMENT OF VISUAL IMPACTS		5.2.15	-	-	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer
<u>Primary Objective:</u>					
1	Prevent of minimise potential visual impacts emanating from the activity				
2					
3					



4						
<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	If at all possible the ash disposal facility should be shaped in such a way that it could be rehabilitated to blend in with the contours of the surrounding landscape.	C, O, CL	C, PM	Relevant plant	Compliance monitoring reports	Monthly
2	The side slopes should be designed in such a way that they are articulated to form natural shaded areas.	C, O, CL	C, PM	Relevant plant	Compliance monitoring reports	Monthly
3	A registered Professional Landscape Architect could assist with the final design and rehabilitation plan of the ash disposal facility.	PC	PM, landscape architect	Concept design drawings	Signed detailed design drawings	Once off
4	Only indigenous vegetation should be used for rehabilitation / landscaping purposes.	C, O, CL, PCL	C, PM	Vegetation nursery	Compliance monitoring reports	Monthly
5	Avoid high pole top security lighting along the periphery of the project area if possible.	All phases	C, PM	Lighting infrastructure	Compliance monitoring reports	Monthly
6	Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the ash disposal facility.	All phases	C, PM	Lighting infrastructure	Compliance monitoring reports	Monthly
7	Light public movement areas (pathways and roads) with low level 'bollard' type lights and avoid post top lighting.	All phases	C, PM	Lighting infrastructure	Compliance monitoring reports	Monthly
8	Use security lighting at the periphery of the site that is activated by movement and are not permanently switched on.	All phases	C, PM	Lighting infrastructure	Compliance monitoring reports	Monthly
9	Plant trees at strategically identified locations to aid in camouflaging of the ADF and conveyor alignment, especially near sensitive receptors.	All phases	C, PM	Lighting infrastructure	Compliance monitoring reports	Monthly

## 5.2.16 TRAFFIC, ROADS AND ACCESS MANAGEMENT

Environmental Specification		Section	Component	Sub-section	Legend
TRAFFIC, ROADS AND ACCESS MANAGEMENT		5.2.16	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>
Primary Objective:					
1	Ensure proper planning and construction of access roads to minimise impact on environment.				
2	Minimise damage to existing access roads				
3	Ensure monitor and maintenance of new roads.				
4	Minimise impacts on the traffic patterns in the area				

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	Manage survey and construction of roads strictly according to the approved, signed detailed design drawings.	C, O	C, PM	Detailed design drawings	Minutes of progress meetings	Daily
2	The condition of existing access / private roads to be used shall be documented with photographs prior to construction.	PC	SHEQO, C	Camera	Pre-construction & Compliance audit reports	Monthly
3	Markers next to or on the road shall show the direction of travel.	All phases	SHEQO, C, PM	Markers and signage	Appropriate signage and accident records.	Daily
4	Roads not to be used shall be marked with a "NO ENTRY" sign.	All phases	SHEQO, C, PM	Markers and signage	Public complaints register	Daily
5	Where required, speed limits shall be indicated and speed control measures applied on the roads.	All phases	SHEQO, C, PM	Signage and speed control measures	Public complaints register	Daily
6	New road construction must be undertaken strictly according to relevant guidelines and standards.	C, O	C, PM	Relevant guidelines and standards	Minutes of progress meetings	Daily
7	No roads shall be constructed on slopes of more than 20 % unless such roads follow contours.	C, O	C, PM	Relevant guidelines and standards	Minutes of progress meetings	Daily
8	In wet areas the Contractor shall only use existing roads or alternative methods of construction. The Contractor shall take such areas into consideration during the tender.	C, O	C, PM	Alternative design drawings	Minutes of progress meetings	Daily
9	Any dangerous crossings shall be marked as such and where necessary, speed limits shall be enforced.	All phases	SHEQO, C, PM	Signage and speed control measures	Public complaints register	Daily
10	All existing private access roads used for construction purposes shall be maintained to ensure an acceptable road surface quality.	All phases	SHEQO, C, PM	Grading plant	Public complaints register	Daily

<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
11	All gates shall be fitted with locks and be kept locked at all times or have <u>controlled access</u> .	All phases	SHEQO, C, PM	-	No gates left open, no incidents	Daily
12	If any fencing interferes with the construction process, such fencing shall be deviated / protected until construction is completed.	All phases	SHEQO, C, PM	-	-	Daily
13	All onsite traffic can be restricted to specific designated roads. Off-road travel can only be authorized on a case-by-case basis (e.g. access to a remote monitoring well, etc.). Traffic speed can also be restricted to an appropriate level on all designated roads.	All phases	SHEQO, C, PM	Signage and speed control measures	Public complaints register	Daily
14	Deploy Pointsmen at both the Kusile Power Station and New Largo Mine Access roads during the construction phase to control the traffic movement.	All phases	PM	Pointsmen	Public complaints register	Daily

### 5.2.17 CONSTRUCTION SITE MANAGEMENT

Environmental Specification		Section	Component	Sub-section	Legend
CONSTRUCTION SITE MANAGEMENT		5.2.17	Site establishment, demarcation and clearing	A	<div><div>Phase</div><div>PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure</div><div>Responsibility</div><div>D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer</div></div>
Primary Objective:					
1	Ensure proper demarcation of the project area prior to construction.				

2	Finalise Site Layout Master Plan.					
3	Minimise impact on natural and No-Go areas.					
<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	A demarcated area at or close to the site must be provided for the storage of machinery, plant and trucks as necessary.	All phases	C, PM	EMPr, ECO recommendations	Compliance monitoring reports	Monthly
2	A Site Layout Master Plan illustrating the location and layout of the proposed site camp and working areas must be produced. This plan must be approved by the PM.	PC	PM	Method statements, detail design drawings	Site Layout plan	Once off
3	A photographic record of the area earmarked for the site camp must be produced prior to site establishment. This will serve as a benchmark against which rehabilitation will be measured and shall be kept in the site environmental file.	PC	ECO, PM	Camera, Site Layout Plan	Pre-construction audit report	Once off
4	Prior to construction commencing, the site shall be inspected to identify any sensitive environments.	PC	ECO, specialist	Camera, Site Layout Plan	Pre-construction audit report	Once off
5	Where necessary, the No-Go areas shall be demarcated with hazard tape, fencing or equivalent, and enforced.	PC	ECO, C, PM	Site Layout Plan, demarcation material	Photographic evidence of demarcated areas	Monthly
6	Minimum amount of vegetation clearance must take place in accordance with the Site Layout Master Plan.	C, O	SHEQO, C, PM	Site Layout Plan	Contractor's Site Diary	Daily
7	Alien vegetation within the designated areas must be destroyed.	C, O	SHEQO, C, PM	Site Layout Plan	Compliance monitoring reports	Monthly
8	Construction activities are limited to the development area as demarcated within the site identified for the construction of the ADF.	PC, C, O	SHEQO, C, PM	Site Layout Plan	Compliance monitoring reports	Monthly

<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
9	Any area outside the construction area, required to facilitate access, construction activities, construction camps or material storage areas, where necessary, shall be negotiated with the affected stakeholders and written agreements shall be obtained.	All phases	SHEQO, C, PM	Site Layout Plan	Documentation of meetings and agreements	Monthly
10	The contractor's camp shall be sited so as to cause the least amount of disturbance to adjacent landowners.	C, O	SHEQO, C, PM	Site Layout Plan	Compliance monitoring reports	Monthly
11	The contractor's camp shall be fenced, with access control, and the contractor shall maintain in good order all fencing for the duration of the construction activities.	C, O	SHEQO, C, PM	Site Layout Plan	Compliance monitoring reports	Monthly
12	Site establishment shall take place in an orderly manner and all amenities shall be installed at Camp sites before the main workforce move onto site.	PC	SHEQO, C, PM	Site Layout Plan	Pre-construction audit report	Once off
13	Vegetation clearing should be restricted to the proposed development footprints only, with no unnecessary clearing permitted outside of these areas.	C, O	SHEQO, C, PM	Site Layout Plan	Contractor's Site Diary	Daily

<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>
CONSTRUCTION SITE MANAGEMENT		5.2.17	Existing services	B	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor
<u>Primary Objective:</u>					
1	Maintain a safe and clean construction site				
2	Ensure development of the site is undertaken according to the site layout master plan				

3	Ensure implemented mitigation measures reduce any adverse impacts on the environment resulting from construction site activities					
4						
<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	It is the Contractor's responsibility to familiarise himself with the position of existing services and infrastructure that may get damaged due to construction activities.	C, O	SHEQO, C, PM	Method Statement	Inspections	Daily
2	Existing services (e.g. roads, pipelines, power lines and telephone services) shall not be disrupted or damaged unless required by the contract and with the permission of the PM.	C, O	SHEQO, C, PM	Method Statement	Inspections	Daily
3	The Contractor shall be responsible, at his own cost, for the repair and reinstatement of any infrastructure that is damaged or services that are interrupted. Such repair or reinstatement shall receive top priority over all other activities.	C, O	SHEQO, C, PM	Incident report	Compliance monitoring reports	Monthly
4	A time limit for the repairs may be stipulated by the PM in consultation with the Contractor.	C, O	SHEQO, C, PM	Incident report	Compliance monitoring reports	Monthly
5	Utilities and other Service Providers such as Telkom and Eskom shall be advised of the construction activities. The Contractor will be responsible for any damage to these services/utilities.	C, O	SHEQO, C, PM	Method Statement	Inspections	Daily

Environmental Specification		Section	Component	Sub-section	Legend
CONSTRUCTION SITE MANAGEMENT		5.2.17	Vegetation clearing	C	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager
Primary Objective:					
1	Prevent unnecessary clearing of vegetation				

2	Minimise adverse impacts arising from vegetation clearing such as erosion and loss of topsoil					
3						
4						
<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	Vegetation clearing shall be done in accordance with Eskom standards and the Vegetation Management Guideline.	C, O	SHEQO, C, PM	Eskom guidelines	Inspections	Daily
2	Vegetation clearing should be conducted in a phased approach in line with the expansion of the ADF.	C, O	SHEQO, C, PM	Site layout drawings	Inspections	Daily
3	Vegetation clearing should be restricted to the proposed development footprint only, with no unnecessary clearing permitted outside of this area.	C, O	SHEQO, C, PM	Site layout master plan	Inspections	Daily
4	Areas to be cleared should be demarcated to prevent unnecessary clearing outside of these demarcated sites.	C, O	SHEQO, C, PM	Site layout master plan	-	Daily
5	Removed topsoil should be stockpiled and used to rehabilitate disturbed areas. Topsoil should ideally not be stockpiled for longer than 12 months and stockpiles should not exceed two metres in height	C, O	SHEQO, C, PM	Site layout master plan	Compliance monitoring report	Monthly
6	The Contractor will remove plants containing any diseases and /or pests from the site.	C, O	SHEQO, C, PM	EMPr	Inspections	Daily
7	The removal of indigenous plant material from the site or adjacent land will not be allowed unless permits are in place.	C, O, CL, PCL	SHEQO, C, PM	Relevant permits	Compliance monitoring report	Monthly
8	All trees and vegetation cleared from the site shall be cut into manageable lengths and removed from the site.	C, O	SHEQO, C, PM	Relevant plant	Inspections	Daily
9	Vegetation shall not be stockpiled on site for extended periods of time but will be removed from site on a weekly basis.	C, O	SHEQO, C, PM	-	Compliance monitoring report	Monthly
10	No vegetation clearing in the form of de-stumping, scalping or uprooting shall be allowed on river and stream banks, unless for the stream diversion.	C, O	SHEQO, C, PM	-	Compliance monitoring report	Monthly
11	Protected or endangered species of plants shall not be removed unless they are interfering with a structure. Relevant permits must be obtained in this case.	C, O	SHEQO, C, PM	-	Compliance monitoring report	Monthly



<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
12	All protected species not to be removed must be clearly marked and such areas fenced off if required.	C, O	SHEQO, C, PM	-	Compliance monitoring report	Monthly
13	The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. Eskom's approval for the use of herbicides is mandatory.	All phases	SHEQO, C, PM	Appropriate herbicides	Inspections	Daily
14	Application shall be under the direct supervision of a qualified technician. All surplus herbicide shall be disposed of in accordance with the supplier's specifications.	All phases	SHEQO, C, PM	Appropriate herbicides	Inspections	Daily
15	The removal of protected vegetation and medicinal plants during construction must be done in consultation with the provincial environmental authorities, and the appropriate post-construction rehabilitation measures must be implemented in cooperation with the provincial environmental authorities.	C, O	SHEQO, C, PM	-	Records of authority consultations	As required

<u>Environmental Specification</u>	<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>
CONSTRUCTION SITE MANAGEMENT	5.2.17	Excavation, trenching	D	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u>
<u>Primary Objective:</u>				

1	Ensure safe and proper usage of plant and equipment					
2	Ensure safe and proper storage of plant and equipment on site					
3	Ensure appropriate training is provided for site staff using plant and equipment					
4						
<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
1	Appropriate PPE must be used by all workers using excavation plant or working in trenches.	C, O, CL	SHEQO, C, PM	PPE	Inspections	Daily
2	Ensure that the topsoil is kept separate during excavations and that separate layers of soils are returned as they were removed.	C, O, CL	SHEQO, C, PM	Excavation plant	Topsoil stockpiles	Monthly
3	Top soil and subsoil excavated during trenching may be stockpiled next to the trench, but must be set back from the edge of the trench be a minimum distance of 1 m.	C, O, CL	SHEQO, C, PM	Appropriate plant	Inspections	Daily

<b><u>Environmental Specification</u></b>	<b><u>Section</u></b>	<b><u>Component</u></b>	<b><u>Sub-section</u></b>	<b><u>Legend</u></b>
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CONSTRUCTION SITE MANAGEMENT		5.2.17	Material handling, stockpiles & topsoil management	E	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Maintain a safe and clean construction site					
2	Ensure development of the site is undertaken according to the site layout master plan					
3	Ensure implemented mitigation measures reduce any adverse impacts on the environment resulting from construction site activities					
4	Ensure a stable top soil cover is maintained on the ADF slopes and crest.					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	The Contractor will ensure that delivery drivers are informed of all procedures and restrictions required by this EMPr Such drivers will be supervised during off-loading, by a person knowledgeable of the requirements.	C, O, CL	SHEQO, C	EMPr	Delivery supervision	As required
2	Materials will be appropriately secured to ensure safe passage between destinations. Loose loads (e.g. sand, stone chip, fine vegetation, refuse, paper and cement) will be covered.	C, O, CL, PCL	SC, SHEQO, C	Appropriate covering	Delivery supervision	As required
3	The Contractor will be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.	C, O, CL, PCL	SHEQO, C	-	Delivery supervision	As required
4	All material lay-down areas and stockpiles will be subject to the Project Manager’s approval.	C, O, CL, PCL	PM	Site Layout Master Plan	Compliance monitoring reports	Monthly
5	Removed topsoil should be stockpiled and used to rehabilitate disturbed areas. Topsoil should not exceed two metres in height.	C, O	SHEQO, C, PM	Relevant plant	Compliance monitoring reports	Monthly
6	Imported fill / soil / sand materials will be free of weeds, litter and contaminants.	C, O, CL, PCL	SHEQO, C	Delivered material	Delivery supervision	As required
7	Storage areas will be roofed in an impervious material, with a suitable overhang or side cladding.	C, O, CL, PCL	SHEQO, C	Site Layout Master Plan	Compliance monitoring reports	Monthly

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
8	Locate all topsoil stockpiles outside delineated wetland and 32m buffer zone. Install sediment barriers along the lower edge of the soil stockpile. Limit the height of the topsoil stockpile and minimise the slope of the side slopes to avoid collapses.	C, O, CL, PCL	SHEQO, C	Site Layout Master Plan	Compliance monitoring reports	Monthly
9	Monitor vegetation establishment to ensure successful establishment.	C, O, CL, PCL	SHEQO, C, PM	Monitoring audit form	Compliance monitoring reports	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
CONSTRUCTION SITE MANAGEMENT		5.2.17	Workshop	F	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Maintain a safe and clean construction site					
2	Ensure development of the site is undertaken according to the site layout master plan					
3	Ensure implemented mitigation measures reduce any adverse impacts on the environment resulting from construction site activities					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	If at all possible, no workshop should be erected within the site development footprint or Contractor's site camp.	PC	PM, C	Site layout master plan	Pre-construction Compliance monitoring	Once off
2	If the establishment of a workshop on site is unavoidable, the workshop location must be approved and indicated in the site layout master plan.	PC	PM, C	Site layout master plan	Pre-construction Compliance monitoring	Once off
3	Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediated to the satisfaction of the ECO.	C, O	SHEQO, C	Site layout master plan	Compliance monitoring reports	Monthly
4	Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop area.	C, O	SHEQO, C	Site layout master plan	Compliance monitoring reports	Monthly
5	Only emergency repairs shall be allowed outside the workshop area on site and a drip tray shall be used to prevent oil spills.	C, O	SHEQO, C	Drip trays	Compliance monitoring reports	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
CONSTRUCTION SITE MANAGEMENT		5.2.17	Hazardous materials, fuel	G	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure safe storage of hazardous materials					
2	Ensure safe usage of hazardous materials					
3	Ensure appropriate training is provided for site staff using hazardous materials					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	All hazardous materials shall be clearly marked with symbolic safety/hazard warning signs, documented in a register, and stored according to best practice guidelines.	C, O, CL	SHEQO, C, PM	MSDS, materials register	Compliance monitoring reports	Monthly
2	All hazardous substances shall be stored in suitable containers and storage areas shall be bunded. This includes all carbon substances like fuel and oil as well as herbicides and battery acid.	C, O, CL	SHEQO, C, PM	Method statements	Compliance monitoring reports	Monthly
3	Locate temporary waste and hazardous substance storage facilities out of the 1:100 flood line.	C, O, CL	SHEQO, C, PM	Method statements	Compliance monitoring reports	Monthly
4	All potentially hazardous raw and waste materials are to be handled by the Contractor’s trained staff and stored on site in accordance with manufacturer’s instructions and approved method statements.	C, O, CL	SHEQO, C, PM	Method statements	Compliance monitoring reports	Monthly
5	Fire extinguishers should be available at conspicuous places and should also be serviced as required.	All phases	SHEQO, C, PM	Clearly visible fire extinguishers	Compliance monitoring report	Monthly
6	The relevant Material Safety Data Sheets (MSDS) shall be available on site. Procedures detailed in the MSDS shall be followed in the event of an emergency situation.	C, O, CL	SHEQO, C, PM	MSDS	Compliance monitoring reports	Monthly
7	The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site.	All phases	SHEQO, C, PM	Readily available spill kit	Compliance monitoring report	Monthly

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
8	Unless specifically authorised, fuel shall not be stored on site, but shall be transported to the site in small quantities as and when required. However, where fuel is to be stored on site, all necessary approvals regarding storage and dispensing shall be obtained from the appropriate authorities.	All phases	SHEQO, C, PM	Relevant approvals	Compliance monitoring report	Monthly
9	The location of the fuel storage area shall be approved by the PM and ECO.	All phases	SHEQO, C, PM	Relevant approvals, Site layout Master Plan	Compliance monitoring report	Monthly
10	All liquid fuels and oils shall be stored in tanks with lids and that these are kept firmly locked at all times. The design and construction of the storage tanks shall be in accordance with a recognised code and as approved by the PM.	C, O, CL	SHEQO, C, PM	MSDS	Compliance monitoring reports	Monthly
11	Where reasonably practical, plant shall be refuelled at a designated refuelling area or at the workshop as applicable. If it is not reasonably practical then the surface under the temporary refuelling area shall be protected against pollution to the reasonable satisfaction of the PM prior to any refuelling activities.	C, O, CL	SHEQO, C, PM	Drip trays	Inspections, Site diary	Daily
12	A supply of absorbent material must always be readily available to absorb/break down any hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill. This material must be approved by the PM prior to any refuelling or maintenance activities.	C, O, CL	SHEQO, C, PM	Absorbent spill material	Compliance monitoring reports	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
CONSTRUCTION SITE MANAGEMENT		5.2.17	Plant & equipment	H	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure safe and proper usage of plant and equipment					
2	Ensure safe and proper storage of plant and equipment on site					
3	Ensure appropriate training is provided for site staff using plant and equipment					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	All drivers and operators of plant and equipment must be appropriately licensed and have undergone environmental awareness training or induction.	All phases	SHEQO, C, PM	Skilled, licenced operators	Documentation of licensing, training registers.	Monthly
2	All diesel powered equipment must be regularly maintained and kept at a high level of maintenance. This must particularly include the regular inspection and, if necessary, replacement of intake and exhaust silencers. Any change in the noise emission characteristics of equipment must serve as trigger for withdrawing it for maintenance. Vehicles should also be inspected for leaks	C, O, CL	SHEQO, C, PM	Vehicle/plant checklist template	Compliance monitoring reports	Monthly
3	Vehicles, plant or equipment found leaking or is not in a state of good working order must be repaired immediately or removed from site.	C, O, CL, PCL	SHEQO, C, PM	Vehicle/plant checklist	Inspections	Daily
4	No unauthorised construction equipment, vehicles or unauthorised personnel will be allowed onto the construction site or areas that have been re-vegetated.	C, O, CL, PCL	SHEQO, C, PM	Access documentation	Inspections	Daily
5	Appropriate PPE must be used by all workers using plant and hand tools during construction site activities.	C, O, CL	SHEQO, C, PM	PPE	Inspections	Daily
6	No washing of plant may occur on the site unless the water is treated sufficiently with monitoring in place.	C, O, CL	SHEQO, C, PM	-	Compliance monitoring report	Monthly
7	Drip trays must be used for the stationary vehicles and for the “parked” plant.	All phases	SHEQO, C, PM	Drip trays	Compliance monitoring report	Monthly



<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>	
<b>CONSTRUCTION SITE MANAGEMENT</b>		<b>5.2.17</b>	Batching plants & concrete works	I	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
<b>Primary Objective:</b>						
1	Maintain a safe and clean construction site					
2	Ensure development of the site is undertaken according to the site layout master plan					
3	Ensure implemented mitigation measures reduce any adverse impacts on the environment resulting from construction site activities					
4						
<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
1	The location of the batching plant will be approved by the PM and indicated on the Site Layout Master Plan.	C, O	SHEQO, C, PM	Method Statement	Inspections	Daily
2	During the mixing of concrete, concrete dust is emanated. Workers mixing concrete must wear appropriate PPE.	C, O	SHEQO, C, PM	PPE	Inspections	Daily
3	The batching plant shall be fitted with a waste water containment system to ensure that contaminated water does not pollute the surrounding environment	C, O	ECO, PM, C	Waste water containment system	Compliance monitoring reports	Monthly
4	Cement bags must not become litter after use. They must be disposed of in bins/skips (see Waste Management).	C, O	SHEQO, C, PM	Bins, skips	Inspections	Daily
5	In instances where smaller volumes of concrete or cement is mixed at a site different than the batching plant, use plastic trays or liners when mixing cement and concrete. Never mix cement and concrete directly on the ground.	C, O	SHEQO, C, PM	Method Statement	Inspections	Daily

<b>Environmental Specification</b>		<b>Section</b>	<b>Component</b>	<b>Sub-section</b>	<b>Legend</b>	
<b>CONSTRUCTION SITE MANAGEMENT</b>		<b>5.2.17</b>	Demolition activities	J	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
<b>Primary Objective:</b>						
1	Maintain a safe and clean construction site					
2	Ensure development of the site is undertaken according to the site layout master plan					
3	Ensure implemented mitigation measures reduce any adverse impacts on the environment resulting from construction site activities					
4	Minimise any impacts originating from demolition activities					
<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
1	In the event that demolition activities are required during the life of the project, the demolisher shall use razing methods that offer a high degree of control, e.g. jack-hammering and long reach excavators.	C, O, CL	PM, C	Method statements	Pre-construction Compliance monitoring	Once off
2	Machine-assisted demolishing is to be undertaken during standard working times only.	C, O, CL	PM, C	Demolition equipment	Inspections	Daily
3	Current and valid blasting authorisation must be obtained from the relevant authorities prior to any blasting activity. A copy of this authorisation shall be given to the PM and ECO.	C, O, CL	SHEQO, C, PM	Blasting authorisation documentation	Approved blasting authorisation	As required
4	A Method Statement shall be required for any blasting related activities. No blasting will be permitted unless the Contractor has satisfied the PM and ECO that his proposed blasting methods and controls are such that no damage will be caused to any adjoining structures, pipelines, service or surrounding sensitive environmental areas.	C, O, CL	SHEQO, C, PM	Method statements	Approved method statement	Once off
5	A qualified and registered blaster shall supervise all blasting and rock-splitting operations at all times.	C, O, CL	SHEQO, C, PM	Qualified blaster	Inspections	As required
6	The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area).	C, O, CL	SHEQO, C, PM	Blast monitoring form	Inspections	As required
7	The Contractor shall allow for good quality vibration monitoring equipment and record keeping on site at all times during blasting operations as required by the PM.	C, O, CL	SHEQO, C, PM	Relevant monitoring equipment	Inspections	As required

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
8	Necessary precautions must be taken at all times to prevent damage to special features and the general environment, which includes the removal of fly-rock.	C, O, CL	SHEQO, C, PM	Method statements	Approved method statement	Once off
9	Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the PM.	C, O, CL	SHEQO, C, PM	Incident report	Incident assessment	As required
10	Relevant occupants/owners of surrounding land shall be notified by the Contractor at least one week prior to blasting and any concerns addressed. Buildings within the potential damaging zone of the blast shall be surveyed preferably with the owner present, and any cracks or latent defects pointed out and recorded either using photographs or video. Failing to do so shall render the Contractor fully liable for any claim of whatsoever nature, which may arise.	C, O, CL	SHEQO, C, PM	Notification letters	Inspections	As required
11	The Service provider shall use blast mats for cover material during blasting. Topsoil shall not be used as blast cover	C, O, CL	SHEQO, C, PM	Method statements	Inspections	As required
12	Appropriate blast shaping techniques shall be employed to aid in the landscaping of blast areas, and a Method Statement to be approved by the PM, shall be required in this regard.	C, O, CL	SHEQO, C, PM	Method statements	Inspections	As required

Environmental Specification		Section	Component	Sub-section	Legend	
CONSTRUCTION SITE MANAGEMENT		5.2.17	Erosion and sediment management	K	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Prevent of minimise erosion as a result of development activities					
2	Plan infrastructure and develop mitigation measures to prevent erosion prior to commencement of construction					
3	Implement and monitor infrastructure and mitigation measures during construction and operation					
4	Ensure prevention or minimisation of erosion during closure and post-closure through detailed planning and implementation					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	All cut, fill and sloping activities must be undertaken according to approved design drawings and approved method statements.	C, O, CL	SHEQO, C, PM	Design drawings, method statements	Regular inspections	Weekly
2	Sensitive areas where erosion may be prevalent must be identified on the site layout master plan and demarcated if this area falls outside the development footprint. All excavated and filled slopes and stockpiles must be of a stable angle and capable of accommodating normal expected flows.	All phases	SHEQO, C, PM	FEIR, EMPr, site master plan	Compliance monitoring reports	Monthly
3	Infrastructure designed to prevent or minimise erosion, or may cause erosion once constructed, must be signed off by a professional engineer prior to construction.	PC	PM	Detail design drawings	Signed off review sheet, drawing	Once off
4	Install sediment traps and storm water berms as soon as possible during the construction process. Silt traps should be regularly inspected and cleaned to ensure optimal functionality.	C, O, CL, PCL	C, PM	Detail design drawings	Signed off review sheet, drawing	Monthly
5	Storm water berms should be appropriately sloped and stabilised (e.g. revegetated) to prevent collapses.	C, O, CL, PCL	C, PM	Detail design drawings	Signed off review sheet, drawing	Monthly
6	All signed drawings associated with the development of the ADF infrastructure must be available on site at all times.	All phases	C, PM	Detail design drawings	Signed off review sheet, drawing	Monthly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
7	Areas susceptible to erosion must be protected by installing necessary temporary and / or permanent drainage works as soon as possible and by taking suitable measures to prevent surface water concentration into nearby roadways or river courses.	All phases	SHEQO, C, PM	FEIR, EMPr, Detail design drawings	Compliance monitoring reports	Monthly
8	Stabilisation of cleared areas to prevent and control erosion will be actively managed. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to specific needs of the site to ensure acceptable rehabilitation.	C, O, CL, PCL	SHEQO, C, PM	Method statements	Compliance monitoring reports	Monthly
9	Traffic and movement over stabilised areas will be restricted through appropriate demarcation of these areas. Any damage to stabilised areas will be repaired and maintained to the satisfaction of the Project Manager.	C, O, CL, PCL	SHEQO, C, PM	Demarcation material	Compliance monitoring reports	Monthly
10	No vegetation clearing or topsoil removal may take place within the 32 m buffer surrounding wetlands.	C, O, CL, PCL	SHEQO, C, PM	Method statements	Compliance monitoring reports	Monthly
11	Limit decommissioning and closure activities to the footprint of the servitude.	C, O, CL, PCL	SHEQO, C, PM	Method statements	Compliance monitoring reports	Monthly
12	Complete conveyor decommissioning activities within a single dry season.	C, O, CL, PCL	SHEQO, C, PM	Method statements	Compliance monitoring reports	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
CONSTRUCTION SITE MANAGEMENT		5.2.17	Waste management	L	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure proposed waste management activities are aligned with legislation.					
2	Maintain a tidy and clean construction site					
3	Minimise potential pollution from waste					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	A certificate of disposal shall be obtained by the Contractor and kept on site. All waste and construction material generated during construction and operation of the facility must be removed and disposed of at a licensed waste disposal facility.	All phases	SHEQO, C	Appointment of waste service provider	Compliance monitoring reports	Monthly
2	In the case where a registered waste site is not available close to the construction site, the Contractor will be responsible to provide a method statement with regard to waste management.	All phases	SHEQO, C, PM	Waste engineer to draft method statement	Approved method statement	Monthly
3	Waste management activities shall be undertaken strictly according to the approved method statement.	C, O	SHEQO, C, PM	Waste engineer to draft method statements	Approved method statements	Once off
4	The Contractor camp shall have the necessary ablution facilities with chemical toilets in the ratio of 1 toilet per 15 staff members.	C, O	SHEQO, C, PM	Sufficient number of chemical toilets	Adequate ablution facilities	Monthly
5	The Contractor shall provide a wastewater management system that will comply with legal requirements and be acceptable to Eskom.	C, O	SHEQO, C, PM	Approved waste management system	Wastewater meets water quality standards	Weekly
6	The Contractor will supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a registered waste disposal facility.	C, O	SHEQO, C	Waste collection bins	No accumulation of waste on site	Monthly

<b>Implementation</b>		<b>Phase</b>	<b>Responsibility</b>	<b>Resources</b>	<b>Reporting / Indicator</b>	<b>Monitoring frequency</b>
7	Under no circumstances may solid waste be burned on site unless a suitable incinerator is available.	All phases	SHEQO, C	-	-	Daily
8	The disposal of waste shall be in accordance with all relevant legislation.	All phases	SHEQO, C, PM	EIR, EMPr and relevant legislation	Audits compliant with legislation	Monthly
9	All general and construction waste shall be stored temporarily in designated bins or stockpile areas as stipulated by relevant legislation if it cannot be removed from site immediately.	All phases	SHEQO, C	Designated bins and stockpile area	Compliance monitoring reports	Weekly
10	The washing of concrete trucks on site is prohibited. Any spilled concrete shall be cleaned up immediately.	C, O	SHEQO, C	Spill kits and clean up material	Incident report	Weekly
11	The Contractor must provide Authorities with proof of confirmation of service provision from waste service providers for the removal of wastes.	C, O	SHEQO, C	Certificate of disposal of waste	Compliance monitoring reports	Monthly
12	A general site-wide litter clean-up will occur at least once a week.	All phases	SHEQO, C	Litter bags, site staff	Weekly inspections	Weekly
13	Wherever possible, materials such as steel off-cuts, wire, etc will be recycled. To this end, containers for glass, paper, metals, plastics, organic waste and hazardous wastes (e.g. oil rags, paint containers, thinners) will be provided in sufficient quantity on the site.	All phases	SHEQO, C	Recycling containers	Proof of service provider agreement.	Weekly
14	Waste will be removed during off-peak traffic periods to minimise impacts on local traffic patterns.	All phases	SC, SHEQO, C	-	-	Weekly
15	Littering shall be strictly controlled by the contractor. Any employee found littering shall face disciplinary action and/or will be issued with a fine of which the value shall be determined by the PM.	All phases	SHEQO, C, PM	Litter bags, site staff	Incidents of littering,	Daily
16	Blast rock from blasting activities may only be disposed of at a licensed landfill site.	C, O	SHEQO, C	Certificate of disposal of waste	Compliance monitoring reports	Monthly

<b>Environmental Specification</b>	<b>Section</b>	<b>Component</b>	<b>Sub-section</b>	<b>Legend</b>
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CONSTRUCTION SITE MANAGEMENT		5.2.17	Sanitation	M	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Maintain a safe and clean construction site					
2	Ensure development of the site is undertaken according to the site layout master plan					
3	Ensure implemented mitigation measures reduce any adverse impacts on the environment resulting from construction site activities					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	Where existing ablution facilities and associated infrastructure are available the Contractor shall make use of such facilities.	C, O, CL	SHEQO, C	Existing ablution and sanitary facilities	Compliance monitoring reports	Monthly
2	The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.	C, O, CL	SHEQO, C	Appropriate ablution facilities	Compliance monitoring reports	Monthly
3	Ablution facilities must be maintained in a hygienic state and serviced regularly. Toilet paper will be provided.	C, O, CL	SHEQO, C	Appropriate ablution facilities	Compliance monitoring reports	Monthly
4	Locate temporary sanitation facilities out of the 1: 100 year flood line.	C, O, CL	SHEQO, C	Appropriate ablution facilities	Compliance monitoring reports	Monthly
5	The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed provider removes the contents from the site.	C, O, CL	SHEQO, C	Appropriate ablution facilities	Compliance monitoring reports, agreement with service provider	Monthly
6	Disposal of such waste is only acceptable at a licensed waste disposal facility. Disposal certificates shall be obtained from the service provider and included in the site file.	C, O, CL	SHEQO, C, service provider	Honey sucker trucks	Compliance monitoring reports, disposal cert. in site file	Monthly



<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
7	Portable ablution facilities to be provided at a maximum ration of 1:15 people with separate facilities for men and women.	C, O, CL	SHEQO, C, service provider	Appropriate ablution facilities	Compliance monitoring reports	Monthly
8	The Contractor shall supply a wastewater management system that will comply with legal requirements and Eskom standards and guidelines. A septic tank system is recommended considering the anticipated construction period.	C, O, CL	SHEQO, C	Wastewater management system	Compliance monitoring reports	Monthly
9	Locate ablution facilities at least 100 m from the edge of wetland areas outside the direct development footprint.	C, O, CL	SHEQO, C	EMPr, specialist studies	Compliance monitoring reports	Monthly
10	No washing of machinery or equipment within wetlands areas adjacent to the development sites should be allowed.	C, O, CL	SHEQO, C	-	Compliance monitoring reports	Monthly

Environmental Specification		Section	Component	Sub-section	Legend	
CONSTRUCTION SITE MANAGEMENT		5.2.17	Rest / eating areas	N	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Maintain a safe and clean construction site					
2	Ensure development of the site is undertaken according to the site layout master plan					
3	Ensure implemented mitigation measures reduce any adverse impacts on the environment resulting from construction site activities					
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	The feeding of, or leaving of food for animals, is strictly prohibited.	All phases	SHEQO, C	-	Inspections	Daily
2	No fires for the purpose of cooking or warming purposes will be permitted other than within designated areas.	C, O	SHEQO, C	Designated eating areas	Incident reporting	Daily
3	The cooking area will be positioned such that no vegetation is in close proximity thereto, including overhanging trees. An area around the cooking area will be cleared such that any escaping embers will not start an uncontrolled fire.	C, O	SHEQO, C	Site layout master plan	Incident reporting	Daily
4	Sufficient bins shall be present in the rest / eating area for all general waste material.	All phases	SHEQO, C	Site layout master plan	Compliance monitoring reports	Monthly
5	Dish washing facilities shall be provided. These may be very basic, but a process must be put in place to ensure that wastewater is disposed of appropriately	C, O	SHEQO, C	Designated eating areas	Inspections	Daily

Environmental Specification		Section	Component	Sub-section	Legend	
CONSTRUCTION SITE MANAGEMENT		5.2.17	Fire prevention	O	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure effective fire prevention measures are in place					
2	Prevent occurrences of veld fires					
3						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	The Contractor will document a fire reduction management plan. The plan will identify fire hazards and appropriate management measures to reduce the identified risks.	PC	C, PM	-	Fire Reduction Management Plan	Once off
2	The Contractor shall have firefighting equipment available on all vehicles working on site, especially during the dry winter months.	All phases	SHEQO, C	Firefighting equipment in good working order	Firefighting equipment on all contractor vehicles.	Daily
3	Preferentially no fires will be lit on the site. If however required, fires must be limited to use for cooking and heating use only within a designated area. This area will be a suitable distance from fuel sources. A fire will be constantly monitored while present.	All phases	SHEQO, C	-	No fire related incidents.	Daily
4	Necessary precautions will be taken (e.g. suitable fire extinguisher, welding curtains) when working with welding or grinding equipment near potential sources of combustion, as per best practice standards and guidelines.	All phases	SHEQO, C	Firefighting equipment in good working order	No incidents registered in the site diary	As required
5	All fire control mechanisms (firefighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and be approved by local fire services. Such mechanisms will be present and accessible at all times.	All phases	SHEQO, C	Appointment of qualified investigator	Inspection reports	Monthly
6	The contractor shall designate or appoint a suitable and qualified fire officer for full time duty on site. The fire officer shall undertake at least 2 fire drills every six month period.	All phases	SHEQO, C	Designated fire officer	Fire drills and roll call register	Twice a year

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
7	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.	All phases	SHEQO, C	Toolbox talks, fire awareness training	Signed attendance registers	As required
8	The Contractor will advise the relevant authority of a fire outside of a demarcated area as soon as it starts or is reported.	All phases	SHEQO, C	-	-	When necessary
9	Suitable precautions must be taken (e.g. suitable fire extinguisher, welding curtains) when working with welding or grinding equipment near potential sources of combustion.	C, O	SHEQO, C	Fire extinguishers, welding curtains	No fire related incidents.	Daily

## 5.2.18 CONTROL OF ALIEN VEGETATION

<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>	
<b>CONTROL OF ALIEN VEGETATION</b>		<b>5.2.18</b>	-	-	<b>Phase</b> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <b>Responsibility</b> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
<b>Primary Objective:</b>						
1	Ensure alien vegetation is eradicated where appropriate					
2	Prevent the establishment, re-establishment or spread of alien vegetation					
3						
<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
1	Compile and implement an alien vegetation management / control programme for the entire affected area.	PC	PM	EMPr	Alien vegetation management plan	Once off
2	It is recommended that the ECO be responsible for monitoring the nature and extent of on-site exotic, invasive plants.	C, O, CL, PCL	ECO, PM	EMPr	Compliance monitoring report	Monthly
3	The Developer will be responsible for controlling all alien invasive species, as per the requirements of the Conservation of Agricultural Resources Act (CARA), during the contract and vegetation establishment period.	C, O, CL, PCL	SHEQO, C, PM	EMPr	Compliance monitoring report	Monthly
4	Alien invasive plant material will be preferentially removed in entirety through mechanical means (e.g. chainsaw, bulldozer, hand-pulling of smaller specimens).	C, O, CL, PCL	SHEQO, C, PM	Plant, equipment	Compliance monitoring report	Monthly
5	Alien invasive plant material will not be stockpiled. All such material removed will be removed from the site and dumped at an approved disposal site.	C, O, CL, PCL	SHEQO, C, PM	-	Compliance monitoring report	Monthly
6	If during the establishment period any noxious or excessive weed growth occurs, such vegetation will be removed.	C, O, CL, PCL	SHEQO, C, PM	Plant, equipment	Compliance monitoring report	Monthly
7	Herbicides used must be approved and used as per the supplier's specifications.	C, O, CL, PCL	SHEQO, C, PM	-	Inspections	Daily

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
8	If plants are not removed in entirety but cut-back and systematically treated with approved herbicides, then remaining plant will be monitored for re-growth / re-establishment.	C, O, CL, PCL	SHEQO, C, PM	-	Compliance monitoring report	Monthly
9	All removal of alien vegetation must be undertaken under supervision of suitably trained and qualified individuals.	C, O, CL, PCL	SHEQO, C, PM	Relevant specialist	Inspections	Daily

## 5.2.19 INCIDENT MANAGEMENT AND EMERGENCY PROCEDURES

Environmental Specification		Section	Component	Sub-section	Legend	
INCIDENT MANAGEMENT AND EMERGENCY PROCEDURES		5.2.19	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Ensure rapid identification of incidents on site that require immediate action					
2	Ensure immediate and appropriate response to emergency incidents					
3	Ensure implementation of emergency measures					
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	An emergency preparedness plan should be compiled and all construction staff made aware of procedures in event of a spill. Communicate emergency response measures and a clearly defined chain of communication to rapidly deal with any unforeseen impacts to natural resources, e.g. spills to wetlands.	All phases	C, PM	Defined emergency response measures	Compliance monitoring reports	Monthly
2	All contaminated soil / yard stone shall be removed and be placed in containers. Contaminated material can be taken to one central point where bio-remediation can be done.	C, O, CL	SHEQO, C, PM	Containers, spill kits	Incident Reporting	As required
3	All spills of hazardous substances must be properly documented and reported to the ECO. Keep a detailed log on site of all spills.	C, O, CL	SHEQO, C, PM	Incident report template	Incident Reporting	As required
4	A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site.	C, O, CL	SHEQO, C, PM	Appointed bio-remediation specialist	Incident Reporting	As required
5	Spills should be cleaned up with approved absorbent material such as “Drizit” or “Spillsorb”. These should be kept in sufficient quantities on site to deal with small spills. Absorbent material and contaminated soil should be disposed of at a registered hazardous waste site.	C, O, CL	SHEQO, C, PM	Emergency procedures, spill kits	Incident Reporting	As required
6	In the event of a vehicle or plant breakdown, any oil spills shall be cleaned up immediately and appropriate environmental investigations undertaken and recorded.	C, O, CL	SHEQO, C, PM	Emergency procedures, spill kits	Incident Reporting	As required

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
7	All damage to Eskom property shall be recorded, photographic record kept and reinstated immediately. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable.	All phases	SHEQO, C, ECO	Camera	Incident Reporting	As required
8	All claims for damages should be directed to the Project Manager for appraisal. All claims shall be handled immediately to ensure timeous rectification / payment.	All phases	PM, C	Damage incident report	Incident Reporting	As required
9	All sites displaying incidence of erosion must be actively stabilised and re-vegetated.	All phases	PM, C	Damage incident report	Incident Reporting	As required
10	Relevant emergency telephone contact numbers for staff shall be clearly listed in English and relevant local languages in the site office, construction camp and any other suitable areas.	All phases	PM, C	Telephone list	Compliance monitoring reports	Monthly



## 5.2.20 HEALTH AND SAFETY MANAGEMENT

Environmental Specification		Section	Component	Sub-section	Legend	
HEALTH AND SAFETY MANAGEMENT		5.2.20	-	-	<div>Phase</div> <div>PC : Pre-construction</div> <div>C : Construction</div> <div>O : Operational</div> <div>CL : Closure</div> <div>PCL : Post-closure</div> <div>Responsibility</div> <div>D : Developer</div> <div>PM : Project Manager</div> <div>C : Contractor</div> <div>SC : Sub-contractor</div> <div>ECO : Environmental Control Officer</div> <div>SHEQO : Safety, Health, Environment and Quality Officer</div>	
Primary Objective:						
1	Minimise impact of dust and particulate matter fallout on adjacent properties					
2	Minimise impact of dust and particulate matter on air quality in the area					
3						
4						
Implementation		Phase	Responsibility	Resources	Reporting / Indicator	Monitoring frequency
1	All staff and sub-contractors shall undergo health and safety awareness training before allowed to work on site. Copies of the attendance registers for this training shall be kept on site in the site file at all times.	All phases	SHEQO, C, PM	Health and safety training material, site file	Compliance monitoring reports	Monthly
2	All staff shall be issued with appropriate PPE in relation to the type of activity which will be the primary work area of each staff member. Copies of issue slips shall be kept on site in the site file at all times.	All phases	SHEQO, C, PM	PPE, site file	Compliance monitoring reports	Monthly
3	No staff member shall be allowed to work alone in trenches. At least two staff members must be deployed in trenches and must not work apart more than two meters from one another.	C, O	SHEQO, C, PM	PPE	Inspections	Daily
4	When working in trenches, a ladder shall always be placed inside the trench to allow rapid exist. The ladder will service workers 10 meter on either side of the ladder.	C, O	SHEQO, C, PM	PPE, ladder	Inspections	Daily
5	Trenches shall be checked daily before work commences for the presence of dangerous animals such as snakes. Dangerous animals shall be removed by a qualified professional and released back into the environment.	C, O	SHEQO, C, PM	PPE	Inspections	Daily
6	The walls of all trenches must be checked for stability daily before staff may be allowed to enter a trench.	C, O	SHEQO, C, PM	PPE, ladder	Compliance monitoring reports	Monthly

<b><u>Implementation</u></b>		<b><u>Phase</u></b>	<b><u>Responsibility</u></b>	<b><u>Resources</u></b>	<b><u>Reporting / Indicator</u></b>	<b><u>Monitoring frequency</u></b>
7	Construction areas, trenches and other potential construction-related danger areas must be clearly demarcated with hazard tape and/or be fenced as appropriate.	C, O	SHEQO, C, PM	Hazard tape, fencing	Compliance monitoring reports	Monthly
8	The construction site shall be off limits to the general public at all times during the construction period and during site clean-up.	C, O	SHEQO, C, PM	Appropriate signage	Site diary	Monthly
9	Hazard and warning signs shall be erected in the relevant languages at appropriate positions warning traffic of construction activities ahead and at problem sites, and that they are maintained in good condition.	C, O	SHEQO, C, PM	Appropriate signage	Compliance monitoring reports	Monthly
10	No smoking shall be allowed in the vicinity of the fuel storage area. At least one no-smoking warning sign must be erected and be clearly visible at the fuel storage area to warn all staff of associated dangers.	All phases	SHEQO, C, PM	Appropriate signage	Site diary	Daily
11	There shall be adequate firefighting equipment at or close to the fuel storage and dispensing area(s).	All phases	SHEQO, C, PM	Firefighting equipment	Compliance monitoring reports	Monthly
12	Fuel shall be kept under lock and key at all times.	All phases	SHEQO, C, PM	Locks and fencing	Compliance monitoring reports	Monthly

## 5.2.21 REHABILITATION

<u>Environmental Specification</u>		<u>Section</u>	<u>Component</u>	<u>Sub-section</u>	<u>Legend</u>	
<b>REHABILITATION</b>		<b>5.2.21</b>	-	-	<u>Phase</u> PC : Pre-construction C : Construction O : Operational CL : Closure PCL : Post-closure <u>Responsibility</u> D : Developer PM : Project Manager C : Contractor SC : Sub-contractor ECO : Environmental Control Officer SHEQO : Safety, Health, Environment and Quality Officer	
<b>Primary Objective:</b>						
1	Ensure rehabilitation is undertaken according to stipulated specifications					
2	Ensure rehabilitation is successfully implemented by the responsible party					
3	Ensure monitoring of rehabilitated areas be undertaken to ensure successful stabilisation and revegetation of disturbed areas					
<u>Implementation</u>		<u>Phase</u>	<u>Responsibility</u>	<u>Resources</u>	<u>Reporting / Indicator</u>	<u>Monitoring frequency</u>
1	A suitable rehabilitation programme should be developed and implemented in all disturbed areas post-construction.	C, O, CL, PCL	SHEQO, C, PM	-	Compliance monitoring reports	Monthly
2	All disturbed areas should be re-vegetated with indigenous species as per an approved rehabilitation plan.	C, O, CL, PCL	SHEQO, C, PM	Rehabilitation plan	Compliance monitoring reports	Monthly
3	A vegetation and erosion monitoring plan should be established for all rehabilitated sites with clearly defined measures to respond to erosion damage or unsuccessful revegetation.	PC	PM	EMPr, Specialist studies	Pre-construction audit	Once off
4	Revegetation of areas identified as high erosion risk areas must be stabilised and seeded upon completion of the construction activities. Areas with minor erosion risk may be rehabilitated using the natural stockpiled topsoil with viable seed bank.	C, O, CL, PCL	SHEQO, C, PM	Rehabilitation plan	Compliance monitoring reports	Monthly
5	Following construction activities the entire diversion floor should be landscaped to remove all obstacles and ruts that could lead to the formation of preferential flow paths.	C, O, CL, PCL	SHEQO, C, PM	Rehabilitation plan	Compliance monitoring reports	Monthly
6	Re-vegetation of the stream diversion floor should proceed naturally and establish rapidly if sufficient flow through the wetland is available. Should exceptionally low flows be encountered due to drought conditions, seeding of the diversion might be required to ensure rapid vegetation establishment.	C, O, CL, PCL	SHEQO, C, PM	Rehabilitation plan	Compliance monitoring reports	Monthly
7	More terrestrial areas such as the sideslopes of the stream diversions will not re-vegetate naturally and should be seeded with a suitable mix of indigenous highveld grasses.	C, O, CL, PCL	SHEQO, C, PM	Rehabilitation plan	Compliance monitoring reports	Monthly

## 6 MONITORING

This chapter deals with specific monitoring requirements, as per the specialist studies, during and after construction.

### 6.1 AQUATIC MONITORING RECOMMENDATIONS

A comprehensive monitoring (including biomonitoring) programme should be compiled. Monitoring should target discharge points as well as impacts to downstream watercourses. Results should be compared with baseline levels given in this report (and any other pre-development data). The following points should included:

- The discharge points that should be included within the monitoring plan include
  - All storm water discharge points,
  - Discharges from the sediment traps,
  - The sediment traps themselves and
  - Wetland crossings.
- Visual inspections with photographic records should be conducted regularly (e.g. weekly - monthly).
- Discharge points should be inspected for signs of erosion and sediment deposition, and corrective measures implemented should any erosion damage be observed.
- Where sediment build up occurs at the discharge points or sediment smothers vegetation downstream of the discharge points, the source of the sediment should be identified and corrective measures implemented to prevent further sedimentation.
- The sediment traps should be inspected and cleaned on a regular basis to ensure efficient operation of the sediment trap.
- Monitoring and maintenance guidelines as detailed in the surface water hydrology report (which includes the design of the sediment trap) should be applied.
- Biomonitoring should include:
  - Water quality (including major anions and cations, pH, ICP scans for metals, TSS, turbidity)
  - Habitat Integrity
  - SASS5 and fish
  - Wetland Rehabilitation and/or erosion (e.g. of the Klipfonteinspruit)
- Sampling sites should include sites KS1, KS2, KS3, W5, W6 and TS2, with additional sites where relevant and identified.
- It is recommended that water quality monitoring be conducted every four months, with pH, Electrical conductivity, suspended solids and turbidity monitored weekly during the construction phase.
- Biomonitoring should be conducted every 4-6 months. The PM and EM shall be responsible for appointing appropriately qualified specialists to undertake the biomonitoring.

- It is essential that recommendations given in monitoring and biomonitoring reports be translated into follow-up action that is documented and audited. ~~Failure to do so renders the biomonitoring process useless.~~
- The PM and EM shall be responsible for incorporation of the findings and recommendations in the EMPr and ECO audit checklists. The PM may appoint a suitably qualified professional to undertake these tasks on Eskom's behalf.

## **6.2 SURFACE AND GROUNDWATER MONITORING PLAN**

A long-term monitoring programme must be developed based on the guideline documented in Best Practice Guideline G3. Water Monitoring Systems (2007) available from DWA. These guidelines are summarised and implemented in the proposed monitoring plan.

### **6.2.1 General Principals of Monitoring**

Monitoring on operations such as mines consists of various components. It must be recognized and understood that the successful development and implementation of an appropriate, accurate and reliable monitoring programme requires that a defined structured procedure be followed. A monitoring programme must include the location of all monitoring points (indicated on a map), the type of data to be collected, as well as the data collection (protocol/procedure/methodology, frequency of monitoring and parameters determined, quality control and assurance), management (database and assessment) and reporting procedures. This programme must then be implemented. The results from the monitoring programme should be representative of the actual situation. To ensure that the monitoring programme functions properly, an operating and maintenance programme should be developed and implemented. A data management system is necessary to ensure that data is stored/used optimally and is accessible to all the relevant users. The monitoring programme must include quality control measures. It is important to note that this programme is dynamic and should change as the mine and water management needs change.

Effective groundwater monitoring systems generally consist of the following components:

- Surface water/groundwater quality monitoring system;
- Flow/water level monitoring system;
- Data and information management system.

When designing the monitoring system the following issues must also be taken into consideration:

- Potential or actual water use;
- Aquifer or catchment vulnerability;
- Toxicity of chemicals;
- Potential for seepage or releases;
- Quantities and frequency of release to the environment (point and non-point);

- Management measures in place to minimize risk.

### 6.2.2 Monitoring plan for preferred site alternative – Site A

The present monitoring plan present what would be the monitoring requirements in each of the two alternatives for site A, and aim to constitute a better decision tool for the regulatory authorities. The groundwater and surface monitoring is one of the actions to be implemented in the management of the receiving shallow aquifer system in either of the alternatives. The monitoring involves the understanding of:

- The changes in groundwater flow/levels within the mine and to monitor how this change with time.
- The development of a cone of depression and how this extends over time.
- The pollution on the mine and to monitor how the pollution changes with time.

The area influenced by groundwater dewatering, the groundwater discharge and abstraction points, the spring, and the sources of pollution with associated pathways will receive a particular focus in the monitoring plan.

Details of the surface and groundwater monitoring point's locations, which would be set for the initial monitoring network (first 5 years), are given in and are illustrated in Figure 6-1 and Figure 6-2 for site A, and their respective geographic coordinates are presented in Table 6-1.

**Table 6-1: Initial surface water and groundwater monitoring network for Site A**

Monitoring Point	WGS84 Co-ordinates (decimal degrees)	
	Longitude	Latitude
<b>Groundwater Monitoring</b>		
KAM10	28.86341	-25.99264
KAM9-1	28.87815	-25.96275
KABH7	28.88928	-25.99245
KABH8	28.88854	-25.98607
KABH92	28.86266	-25.96389
KABH94	28.85871	-25.97859
KAMP1	28.87690	-25.95439
KAMP2	28.87908	-25.97015
CAMP3	28.88095	-25.97787
KAMP4	28.87523	-25.94794
KAMP5	28.87388	-25.93974
KAMP7	28.88765	-25.97239
KAMP8	28.88628	-25.96527
KAMP9	28.88441	-25.95650
KAMP10	28.88313	-25.94861
CAMP11	28.88197	-25.94218
KAMP12	28.88985	-25.97741
KAMP13	28.89977	-25.97806
KAMP14	28.90926	-25.97824
KAMP15	28.91595	-25.97820
KAMP16	28.91270	-25.98285
KAMP17	28.90356	-25.98289
KAMP18	28.89411	-25.98197

Monitoring Point	WGS84 Co-ordinates (decimal degrees)	
Surface Water monitoring		
KASW23	28.87900	-25.96068
KASW7	28.88816	-25.99342
KAMPS1	28.89856	-25.94035
KAMPS2	28.92228	-25.97334
KAMPS3	28.90451	-26.00374
KAMPS4	28.88146	-25.98085
KAMPS5	28.86982	-26.00364
KAMPS8	28.85155	-25.94269
KAMPS10	28.86058	-25.95817
KAMPS11	28.86346	-25.99441

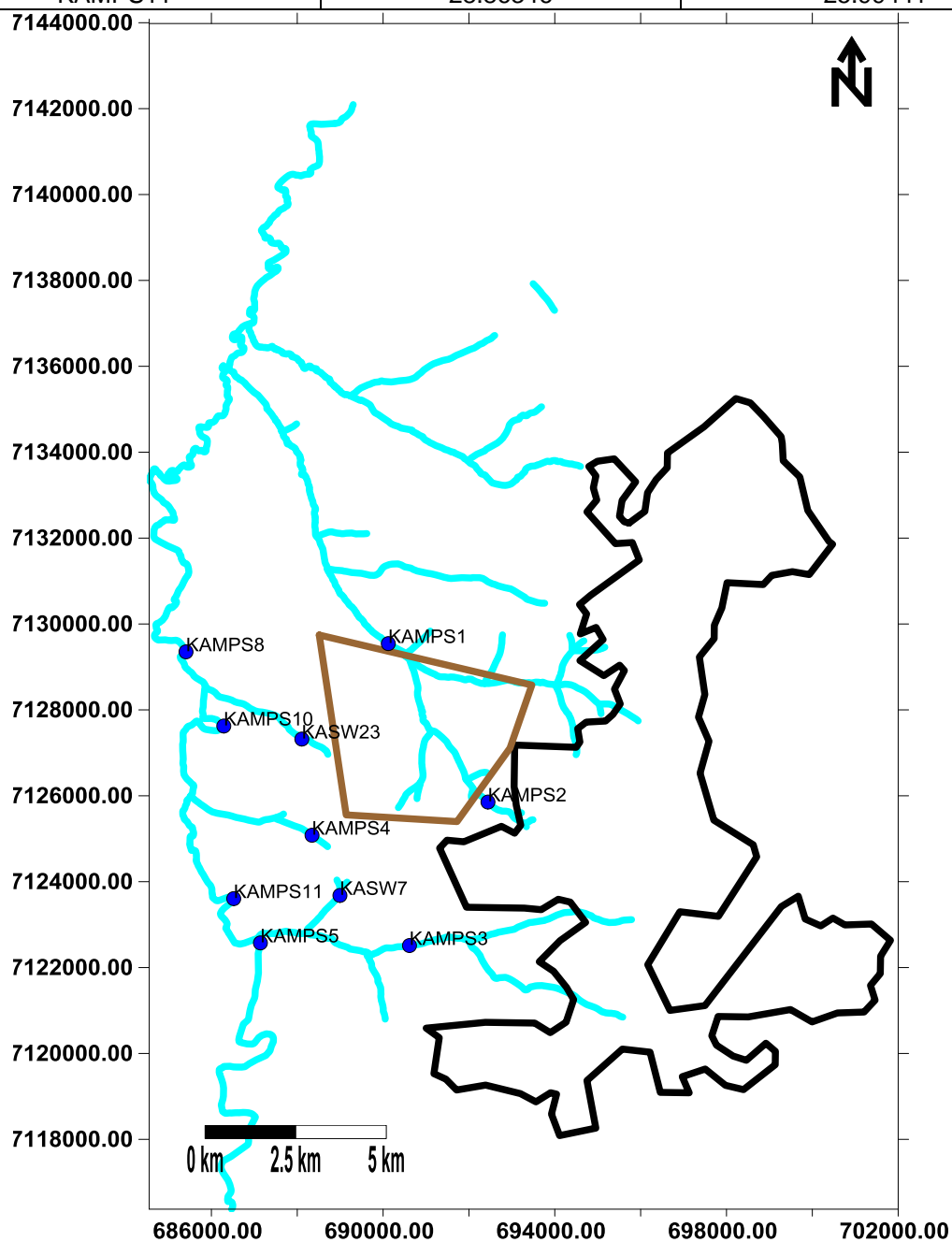


Figure 6-1: Projected initial surface water monitoring points for Site A

### 6.2.3 Recommendations

- Detailed field and numerical studies need to be conducted to:
  - Better delineate the current extent of groundwater contaminations surrounding each of the preferred scenario sites;
  - Understand the link between surface and groundwater;
  - Understand the link between the considered shallow aquifer systems and the deeper aquifer systems;
  - Develop a scoping remediation sign the pumping well field for mitigation actions;

These studies will be undertaken during the Water Use Licencing Application process and will inform the EMPr when the information becomes available.

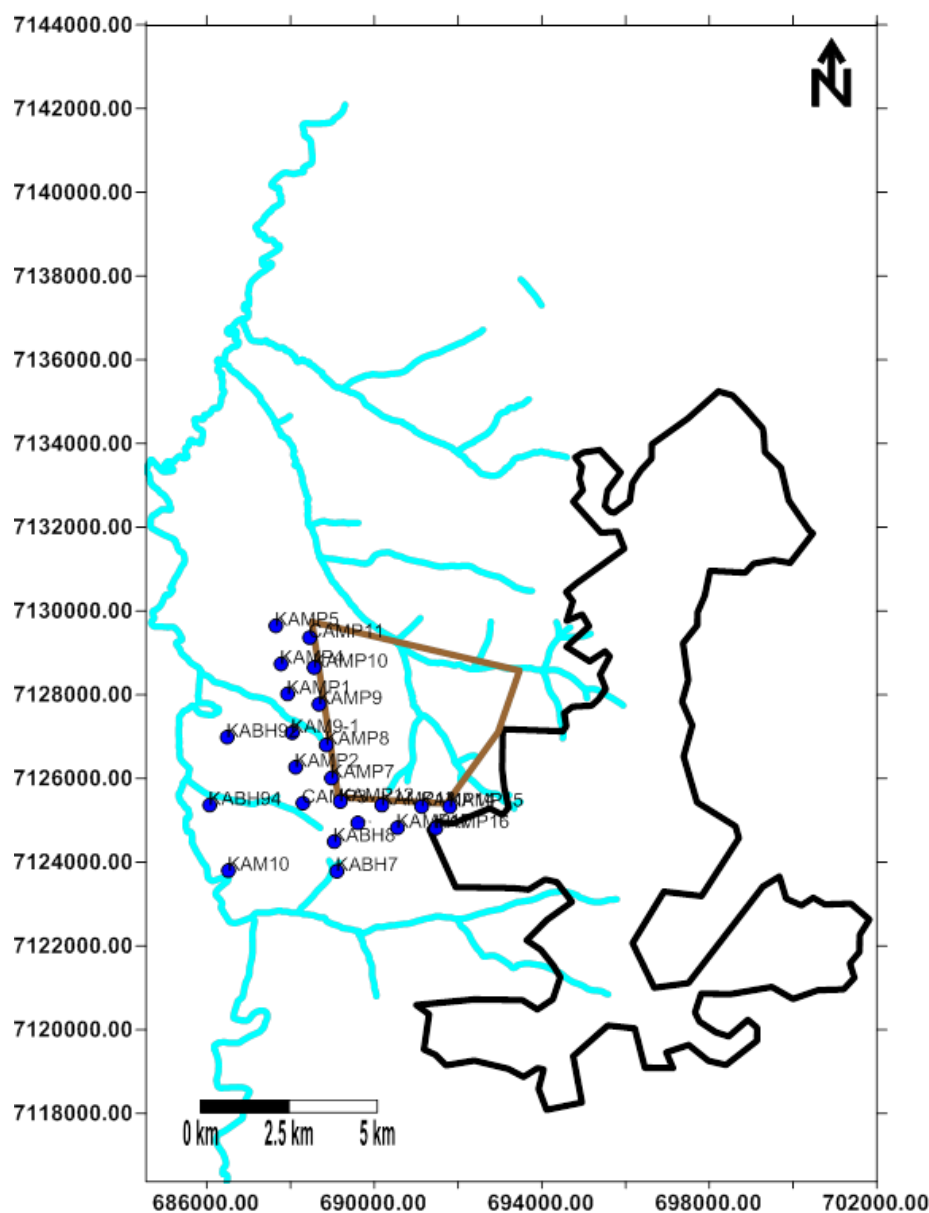


Figure 6-2: Projected initial groundwater monitoring points for Site A



- The existing water monitoring network at the Kusile Power Station, need to be extended by considering the initial monitoring network as proposed in the present monitoring plan, according to the preferred alternative;
- The Initial Groundwater flow and transport model need to be updated based on groundwater monitoring data (water level and quality) in the local aquifer surrounding Site A, and accounting for heterogeneity;
- All the prescriptions of the management plan need to be considered and special attention should be given to the pre-construction mitigation measures.

### 6.3 AIR QUALITY

The following recommendations ~~were extracted from the Air Quality Assessment~~ with regards to air quality monitoring of the ADF are made:

- Air quality monitoring of the ADF must comply with existing air quality mitigation and monitoring conditions stipulated in the EMPr for the Kusile Power Station construction and operation phases;
- In order to ensure that mitigation is effective it is recommended that dust fall monitoring is implemented around the perimeter of the ash disposal facility and on neighbouring land owner's properties, especially in the direction of the prevailing winds and near any sensitive receptors;
- Composition of newly produced Kusile ash must be determined and classified according to SANAS approved methodology when the first ash from Kusile Power Station becomes available;
- It is recommended that ambient air quality, including hazardous trace elements such as aluminium, arsenic, selenium and mercury, be measured;
- It is also recommended that PM10 and fugitive dust be monitored near the ash disposal facility, especially if this is away from any monitoring undertaken by the Power Station. The PM10 filters and dust-fall can further be analysed for heavy metals;
- Emission monitoring results to be reported monthly to the relevant authority;
- A complaints register highlighting air quality related complaints shall be maintained on site. Complaints shall be investigated where necessary;
- Air quality monitoring results shall be communicated to the Kusile EMC and stakeholders.

### 6.4 NOISE MONITORING

It is recommended that, ambient noise measurements be conducted during all project phases to assess and confirm the impact area. Specific attention should be paid to noise levels at noise sensitive receptors within the 1 km noise management zone. Noise measurements should be conducted in accordance with SANS 10103 (2008).

A summary of the proposed noise monitoring plan as well as the parameters that should be sampled are summarised in Table 6-2.

In addition to the measurement of sound pressure levels, the octave band frequency spectra should also be recorded. Frequency spectrum data can provide useful insight into the nature of recorded sound pressure levels and assist with distinguishing between potential sources of noise that contribute to noise levels at a certain location. Source noise measurements could be conducted to confirm equipment manufacturer sound power data and assumed sound power data used in the current study.

**Table 6-2: Proposed monitoring plan**

Parameters to be Measured	Frequency
L <sub>Aeq</sub> (1 hour) between 06:00 and 22:00 <sup>1</sup>	One campaign during the construction/closure/de-commissioning phases. One campaign per year of operation
L <sub>Aeq</sub> (1 hour) between 22:00 and 06:00	One campaign during the construction/closure/de-commissioning phases (if applicable). One campaign per year of operation.
Octave band frequency spectrum	During every campaign.

## 6.5 SOIL MONITORING, MAINTENANCE AND CONSERVATIONS PLAN

Nutrient requirements reported in this document are based on the monitoring and sampling of the soils at the time of the baseline survey. These values will definitely alter during the storage stage and will need to be re-evaluated before being used during rehabilitation. Ongoing evaluation of the nutrient status of the growth medium will be needed throughout the life of the project and into the rehabilitation and closure phases.

During the rehabilitation exercise, preliminary soil quality monitoring should be carried out to accurately determine the fertilizer and pH requirements that will be needed. Additional soil sampling should also be carried out annually after rehabilitation has been completed and until the levels of nutrients, specifically magnesium, phosphorus and potassium, are at the required levels for sustainable growth.

Once the desired nutritional status has been achieved, it is recommended that the interval between sampling is increased. An annual environmental audit should be undertaken. If growth problems develop, ad hoc, sampling should be carried out to determine the problem.

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<sup>1</sup> SANS 10103 specifies day-time to be from 06:00 to 22:00 and night-time from 22:00 to 06:00. The IFC specifies day-time to be from 07:00 to 22:00 and night-time from 22:00 to 07:00.

Monitoring should always be carried out at the same time of the year and at least six weeks after the last application of fertilizer.

Soils should be sampled and analysed for the following parameters:

- pH (H<sub>2</sub>O)
- Phosphorus (Bray I)
- Electrical conductivity
- Calcium (mg/kg)
- Cation exchange capacity
- Sodium (mg/kg)
- Magnesium (mg/kg)
- Potassium (mg/kg)
- Zinc (mg/kg)
- Clay, sand and Silt
- Organic matter content (C %)

The soil utilisation plans for the construction, operational and closure phases are presented in Table 6-3,

Table 6-4 and Table 6-5 below respectively.

**Table 6-3: Construction Phase – Soil Utilization Plan**

Phase	Step	Factors to Consider	Comments
Construction	Delineation of areas to be stripped		Stripping will only occur where soils are to be disturbed by activities that are described in the design report, and where a clearly defined end rehabilitation use for the stripped soil has been identified.
	Reference to biodiversity action plan		It is recommended that all vegetation is stripped and stored as part of the utilizable soil. However, the requirements for moving and preserving fauna and flora according to the biodiversity action plan should be consulted.
	Stripping and Handling of soils	Handling	Soils will be handled in dry weather conditions so as to cause as little compaction as possible. Utilizable soil (Topsoil and upper portion of subsoil B2/1) must be removed and stockpiled separately from the lower "B" horizon, with the ferricrete layer being separated from the soft/decomposed rock, and wet based soils separated from the dry soils if they are to be impacted.
		Stripping	The "Utilizable" soil will be stripped to a depth of 750mm or until hard rock/ferricrete is encountered. These soils will be stockpiled together with any vegetation cover present (only large vegetation to be removed prior to stripping). The total stripped depth should be 750mm, wherever possible.
	Delineation of Stockpiling areas	Location	Stockpiling areas will be identified in close proximity to the source of the soil to limit handling and to promote reuse of soils in the correct areas. All stockpiles will be founded on stabilized and well engineered "pads"
		Designation of Areas	Soils stockpiles will be demarcated, and clearly marked to identify both the soil type and the intended area of rehabilitation.

**Table 6-4: Operational Phase – Soil Conservation Plan**

Phase	Step	Factors to Consider	Comments
Operation	Stockpile management	Vegetation establishment and erosion control	Enhanced growth of vegetation on the Soil Stockpiles and berms will be promoted (e.g. by means of watering and/or fertilisation), or a system of rock cladding will be employed. The purpose of this exercise will be to protect the soils and combat erosion by water and wind.
		Storm Water Control	Stockpiles will be established/engineered with storm water diversion berms in place to prevent run off erosion.
		Stockpile Height and Slope Stability	Soil stockpile and berm heights will be restricted where possible to <1.5m so as to avoid compaction and damage to the soil seed pool. Where stockpiles higher than 1.5m cannot be avoided, these will be benched to a maximum height of 15m. Each bench should ideally be 1.5m high and 2m wide. For storage periods greater than 3 years, vegetative (vetiver hedges and native grass species - refer to Appendix 1) or rock cover will be essential, and should be encouraged using fertilization and induced seeding with water and/or the placement of waste rock. The stockpile side slopes should be stabilized at a slope of 1 in 6. This will promote vegetation growth and reduce run-off related erosion.
		Waste	Only inert waste rock material will be placed on the soil stockpiles if the vegetative growth is impractical or not viable (due to lack of water for irrigation etc.). This will aid in protecting the stockpiles from wind and water erosion until the natural vegetative cover can take effect.
		Vehicles	Equipment, human and animal movement on the soil stockpiles will be limited to avoid topsoil compaction and subsequent damage to the soils and seedbank.

**Table 6-5: Closure Phase – Soil Conservation Plan**

Phase	Step	Factors to Consider	Comments
Decommissioning & Closure	Rehabilitation of Disturbed land & Restoration of Soil Utilization	Placement of Soils	Stockpiled soil will be used to rehabilitate disturbed sites either ongoing as disturbed areas become available for rehabilitation and/or at closure. The utilizable soil (500mm to 750mm) removed during the construction phase, must be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the approved post development end land use (Conservation land capability and/or Low intensity grazing), and will attain a free draining surface profile. A minimum layer of 300mm of soil will be replaced.
		Fertilization	A representative sampling of the stripped and stockpiled soils will be analysed to determine the nutrient status and chemistry of the utilizable materials. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay% and Organic Carbon. These elements provide the basis for determining the fertility of soil. based on the analysis, fertilisers will be applied if necessary.
		Erosion Control	Erosion control measures will be implemented to ensure that the soil is not washed away and that erosion gulleys do not develop prior to vegetation establishment.
	Pollution of Soils	In-situ Remediation	If soil (whether stockpiled or in its undisturbed natural state) is polluted, the first management priority is to treat the pollution by means of in situ bioremediation. The acceptability of this option must be verified by an appropriate soils expert and by the local water authority on a case by case basis, before it is implemented.
		Off site disposal of soils.	If in situ treatment is not possible or acceptable then the polluted soil must be classified according to the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (Local Dept of Water Affairs) and disposed of at an appropriate, permitted, off-site waste facility.

## 6.6 HERITAGE MANAGEMENT PLAN

### 6.6.1 General Management Guidelines

1. In the event that an area previously not included in an archaeological or cultural resources survey is to be disturbed, the SAHRA needs to be contacted. An enquiry must be lodged with them into the necessity for a Heritage Impact Assessment.
2. In the event that a further heritage assessment is required it is advisable to utilise a qualified heritage practitioner, preferably registered with the Cultural Resources Management Section (CRM) of the Association of Southern African Professional Archaeologists (ASAPA).
3. This survey and evaluation must include:
  - The identification and mapping of all heritage resources in the area affected;
  - An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7 of the National Heritage Resources Act;
  - An assessment of the impact of the development on such heritage resources;
  - An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
  - The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
  - If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

- Plans for mitigation of any adverse effects during and after the completion of the proposed development.
4. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. This module must be tailor made to include all possible finds that could be expected in that area of construction. These sections must include basic information on:
    - Heritage;
    - Graves;
    - Archaeological finds; and
    - Historical Structures.
  5. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.
  6. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
  7. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.
  8. After mitigation, an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
  9. If during the initial survey sites of cultural significance are discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
  10. In the event that human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made.
  11. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

The definition of an archaeological/palaeontological monitoring programme is a formal program of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, in the inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

The purpose of an archaeological/palaeontological monitoring programme is:

- To allow, within the resources available, the preservation by recording of archaeological/palaeontological deposits, the presence and nature of which could not

be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works

- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological/palaeontological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.
- A monitoring programme is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.
- The objective of the monitoring programme is to establish and make available information about the archaeological resource existing on a site.

PGS can be contacted on the way forward in this regard.

**Table 6-6: Roles and responsibilities of archaeological and heritage management**

ROLE	RESPONSIBILITY	IMPLEMENTATION
A responsible specialist needs to be allocated and should attend all relevant meetings, especially when changes in design are discussed, and liaise with SAHRA.	The client	Archaeologist and a competent archaeology support team
If chance finds and/or graves or burial grounds are identified during construction or operational phases, a specialist must be contacted in due course for evaluation.	The client	Archaeologist and a competent archaeology support team
Comply with defined national and local cultural heritage regulations on management plans for identified sites.	The client	Environmental Consultancy and the Archaeologist
Consult the managers, local communities and other key stakeholders on mitigation of archaeological sites.	The client	Environmental Consultancy and the Archaeologist
Implement additional programs, as appropriate, to promote the safeguarding of our cultural heritage. (i.e. integrate the archaeological components into the employee induction course).	The client	Environmental Consultancy and the Archaeologist,
If required, conservation or relocation of burial grounds and/or graves according to the applicable regulations and legislation.	The client	Archaeologist, and/or competent authority for relocation services
Ensure that recommendations made in the Heritage Report are adhered to.	The client	The client
Provision of services and activities related to the management and monitoring of significant archaeological sites.	The client	Environmental Consultancy and the Archaeologist
After the specialist/archaeologist has been appointed, comprehensive feedback reports should be submitted to relevant authorities during each phase of development.	Client and Archaeologist	Archaeologist

## 6.6.2 Archaeology

Based on the findings of the HIA, all stakeholders and key personnel should undergo an archaeological induction course during the construction and operational phases. Induction

courses generally form part of the employees' overall training and the archaeological component can easily be integrated into these training sessions. Two courses should be organised – one aimed more at managers and supervisors, highlighting the value of this exercise and the appropriate communication channels that should be followed after chance finds, and the second targeting the actual workers and getting them to recognize artefacts, features and significant sites. This needs to be supervised by a qualified archaeologist. This course should be reinforced by posters reminding operators of the possibility of finding archaeological / palaeontological sites.

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small scale infrastructure development associated with the project/operations.

It is possible that cultural material will be exposed during operations and may be recoverable, but this is the high-cost front of the operation, and so any delays should be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, but construction trenches do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure is often changed or added to during the subsequent history of the project. In general these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction/operational phase, it is important to recognize any significant material being unearthed, and to make the correct judgment on which actions should be taken. A responsible archaeologist/palaeontologist must be appointed for this commission. This person does not have to be a permanent employee, but needs to attend relevant meetings, for example when changes in design are discussed, and notify SAHRA of these changes. The archaeologist would inspect the site and any development on a recurrent basis, with more frequent visits to the actual workforce and operational areas.

In addition, feedback reports can be submitted by the archaeologist to the client and SAHRA to ensure effective monitoring. This archaeological monitoring and feedback strategy should be incorporated into the Environmental Management Plan (EMP) of the project. Should an archaeological/palaeontological site or cultural material be discovered during construction (or operation), such as burials or grave sites, the project needs to be able to call on a qualified expert to make a decision on what is required and if it is necessary to carry out emergency recovery. SAHRA would need to be informed and may give advice on procedure. The developers therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. The project thus needs to have an archaeologist/palaeontologist available to do such work. This provision can be made in an archaeological/palaeontological monitoring programme.



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### **6.6.3 Graves**

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 20 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 rescue permit must be applied for with SAHRA and the local South African Police Services must be notified of the find.
- Where it is then 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:

1. 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;
2. Site notices indicating the intent of the relocation;
3. Newspaper notices indicating the intent of the relocation;
4. A permit from the local authority;
5. A permit from the Provincial Department of Health;
6. 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;
7. An exhumation process that keeps the dignity of the remains intact;
8. The whole process must be done by a reputable company that is well versed in relocations;
9. 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 developing company.

### **6.6.4 Heritage Structures**

- No further mitigation is required for the destruction of most of the architectural structures identified (especially those where only the remains of walls and/or foundations survive).
- For the sites where homestead remains were identified, the possibility of finding still born burials exists and any such burials uncovered should be included in the grave relocation process.
- The structures at sites B5 and B10 will require an application for a demolition permit and this will usually require the documentation of these structures.

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## **6.7 WETLAND AND BIODIVERSITY OFFSET STRATEGY**

### **6.7.1 Rationale**

With the strategic importance of the Wilge River in the Upper Olifants WMA, it is important that the impacts expected from the construction and operational phase of the 60 year ADF (as well as other Kusile infrastructure) on surface water resources be mitigated as best as possible. To this end, Eskom is currently completing a Memorandum of Understanding (MOU) with the South African National Biodiversity Institute (SANBI) in order to provide guidance on designing a wetland offset and mitigation programme that takes cognisance of the SANBI Wetland Offset Guidelines currently under development. The inclusion of SANBI in the process was requested by DWA in the meeting held on the 14th August 2013 at the DWA head office in Pretoria.

The Mitigation Plan however, is not solely designed around the protection of aquatic ecosystems, but will also include aspects of the impacted terrestrial habitat and heritage features such as gravesites.

### **6.7.2 Overview of Preliminary Mitigation Plan**

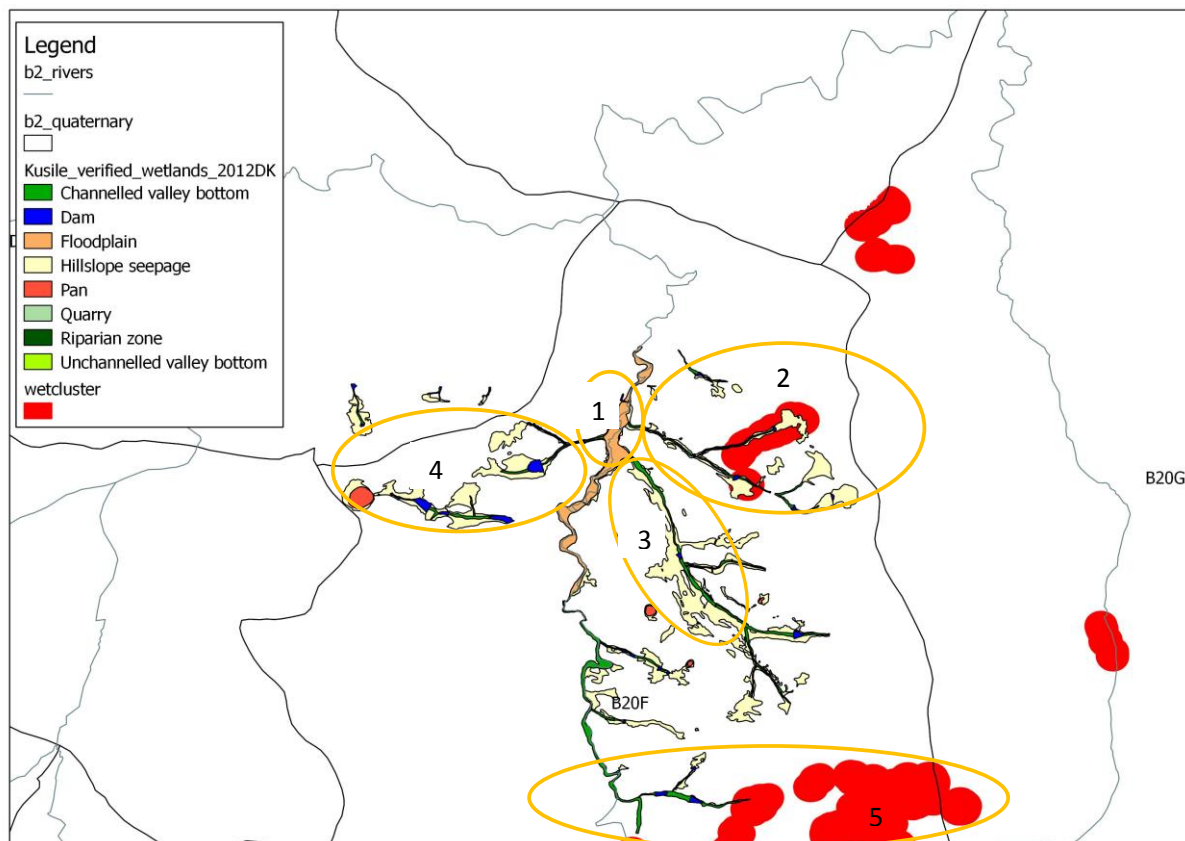
What follows below is a preliminary draft on the areas that have been identified as possible areas for offset activities to take place. It is important to note that these areas are preliminary and will change when the wetland and terrestrial ecologist specialists have completed a full, comprehensive study. The scope of the study would be to identify areas formally and determine whether offsets are feasible in terms of the proposed area ratios and the total functionality of the wetlands to be lost. The specialist study is expected to begin at the end of January 2014.

The purpose of the identified areas is thus twofold; firstly to identify wetland areas that may be suitable for offsetting wetland loss caused by the construction of Kusile and secondly, buffer the Wilge River from any other impacts which may be caused by Kusile in the near future.

Eskom Kusile has recently developed a Draft Wetlands Management Strategy. This document identifies various wetland rehabilitation options. These options rely on a landscape approach of the B20F quaternary catchment, which includes sensitive and threatened habitats, species and vegetation units, comprising riparian zones, wetlands and terrestrial grasslands. It takes cognisance of the fact that both riparian zones and wetlands exist within a matrix of other landscape units and are not divorced from them, often relying on the integrity, intactness and functionality of these units for their own functionality and status. Figure 6-3 below outlines five (5) major components within the B20F quaternary catchment that provide options for an overall strategy for wetland management.

Component 1 is the Wilge River noted and assessed as SQ B20F-01150 (SQ = sub-quaternary). This portion of the Wilge River is 44.2 km within the quaternary and has only 43 % natural landcover within 500 m of the channel (National Landcover Data). The Wilge River also gives rise to large areas of floodplain wetlands. The SQ has recently been assessed for ecostatus (PES = C) and Ecological Importance (EI) and Sensitivity (ES) (both are Moderate), (Louw *et al.* in press). The main impacts in this area are agricultural lands, abstraction and alien vegetation invasion.

Component 2 is dominated by hillslope seepage and channelled valley-bottom wetlands. A significant portion of these wetlands falls within Area C (146 ha; a proposed 60 Year ADF), with the remainder, extensive in area, occurring between Alternative C and Kusile power station itself. Together, these wetlands lumped as component 2 feed into the main Wilge River, so any management of this component that improves functionality will also positively affect the Wilge River. Most of the wetlands within Alternative C are recognised as an important wetland cluster (wetcluster, Nel *et al.*, 2011) with sightings of both Blue Cranes and Secretary Birds. The majority of the wetlands are in a “C” or “D” category, with a significant proportion in “D”. Since the main impacts include elevated storm water with consequent erosion, agricultural activities, high trampling pressure (mostly cattle) and dams there is a high potential for rehabilitation of wetlands (and uplands) with a high probability of achieving significant improvement in PES.



**Figure 6-3: Landscape overview of the B20F quaternary catchment indicating 5 major components (A to E) to a proposed overall wetland management strategy**

Component 3 is dominated by hillslope seepage wetlands with some channelled valley-bottom wetlands and a small portion of floodplain wetlands at the confluence with the Wilge River. The majority of these are category “C” wetlands with some “A” and “D”. The wetlands in component 3 will be directly impacted by activities at Kusile as well as the proposed Kusile ADF if authorised at site A. They therefore form an extensive “buffer” between Kusile and the Wilge River and it is proposed to use this to the advantage of both protecting downstream habitats from elevated flows or sediments and improving the PES of a portion of downstream wetlands.

Component 4 is dominated by hillslope seepage wetlands with some channelled valley-bottom wetlands and a pan. Approximately 50 % of the wetlands in this area are category “D” wetlands, with some “C” and a large proportion of “B” wetlands. Some of these occur within Alternative B (an option for the 60 Year ADF). Main impacts are agriculture and increased wetness due to irrigation runoff / seepage.

Component 5 comprises several wetland clusters noted for national importance (wetcluster, Nel *et al.*, 2011). They fall outside of the original area assessed but occur within the quaternary catchment. Most of cluster 5 would appear to fall within the New Largo footprint. If the wetlands in this area are not mined by New Largo, they will likely be targeted by New Largo for offsets and will not be available to Kusile. While further investigation of the area is required, it is unlikely that it would be available for rehabilitation.

A proposed strategy for overall wetland rehabilitation of the B20F quaternary within a landscape context is outlined below, and is intended to serve as sufficient wetland offset requirements. The steps indicated below are not intended to be prescriptive at this stage, nor are they exhaustive but merely provide a conceptual framework that will require more detailed planning and development. In all cases rehabilitation is intended to improve the overall PES of wetlands, especially where category “C” and “D” wetlands occur:

1. Rehabilitation of the Wilge River and associated floodplain wetlands (Component 1). The PES can be improved and a category “B” may be achievable if alien plants are removed and agricultural encroachment is curtailed by moving crops out of floodplain wetlands. If land is owned or purchased, terrestrial rehabilitation of grasslands is also possible which will enhance overall ecosystem resilience. The rehabilitation potential of the Wilge River is high.
2. Rehabilitation of wetlands outlined in Component 2, especially those associated with the NFEPA wetland cluster, those that occur within Alternative C (an option for the 60 Year ADF) and those already impacted by activities associated with Kusile. The area lends itself to the development of a nature reserve within which both terrestrial and wetland habitats are rehabilitated, with the added possibility of incorporating local communities into the reserve management/ownership. Rehabilitation potential is high and would involve inter alia reducing cattle or replacing with natural grazers, reducing dams (in both number and size i.e. reduce dam wall height), removing artificial levees, developing effective storm water runoff management and removing alien

woody species (particularly Bluegums and Poplars). The main drainage line of Component 2 (parallel to southern boundary of Component 3) is also heavily impacted by Kusile in terms of turbidity, though this is not yet reflected in the aquatic ecology as much as for the Klipfonteinspruit. However, additional interventions to deal with altered flows and turbidity (e.g. small retention dams or upgrade of existing dams) might also be considered for the upper reaches of this drainage line.

3. Some of the wetlands in component 3 will be lost in Alternative 1 and it is proposed that a portion of wetlands closest to the new ADF be “sacrificed” to protect downstream habitats. This would entail utilising an upstream portion of the wetlands to mitigate impacts by installing a series of small retention dams that would trap sediments, improve water quality and disperse runoff. The area required for the retention dams, as well as the capacity of the retention dams, will need to be determined through detailed hydrological modelling. The result would be some portion of upstream wetlands essentially becoming artificial in nature, but retaining desired ecological functions and at the same time protecting and improving downstream ecostatus. The majority of wetlands in the area however are to undergo rehabilitation. A significant portion of the wetlands in Component 3 is associated with agricultural activities in Alternative F where irrigation and artificial runoff is high (and polluted), and disturbance activities promote alien weed success essentially ensuring an efficient refuge of alien weeds that encroach into the wetlands. Rehabilitation of terrestrial grasslands in this area, while not an activity directly associated with wetlands, will effectively enhance the ecostatus of wetlands within a grassland matrix by reducing the source of alien plant species, erosion and elevated runoff. Wetlands in this area also have the potential for the development of a conservation area, and could easily be joined to Component 2. Specific rehabilitation activities could include the removal of the existing breached dam wall near the Wilge River and restoration of the floodplain, the removal of alien plant species, the restoration of upland grasslands (which are also a threatened vegetation unit type).
4. Rehabilitation of wetlands outlined in Component 4, especially those that occur within Alternative B. Rehabilitation of wetlands in this area will be more difficult to achieve since the major impact is related to agricultural encroachment and irrigation and would more than likely require the purchase of land to operationalise.
5. This may not be a viable option but would entail investigating the possibility of improving wetland ecostatus of several NFEPA wetland clusters outlined in Component 5.

Steps 1, 2 and 3 outlined above will significantly improve wetland condition, functionality and integrity within component areas. Should several of the steps become operational it would significantly improve overall wetland (and riparian and terrestrial) ecostatus of the B20F quaternary.

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## **7 SITE DOCUMENTATION/REPORTING**

The standard Eskom site documentation shall be used to keep records on site. In addition all non-compliances to the environmental authorisation will be reported to the Department. All documents shall be kept on site and be available for monitoring and auditing 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 legitimate. Regular monitoring of all site works by the Environmental Control Officer is imperative to ensure that all problems encountered are solved punctually and amicably. When the Environmental Control Officer is not available, the Environmental Personnel of the Contract Manager / Site Supervisor shall keep abreast of all works to ensure no problems arise.

A copy of the EA and approved EMPr must be kept at the property where the activity will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property. In addition the following documentation should also be kept onsite and be readily available:

- Relevant permits and licences;
- Method Statements;
- A daily site diary;
- A non-conformance register; and
- A public complaints register.

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