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## Camden Power Station Ash Disposal Facility Project –

### Final Environmental Management Programme Report

#### FINAL REPORT FOR STAKEHOLDER REVIEW

**Proponent:**

Eskom Holdings SOC Limited  
Megawatt Park  
Maxwell Drive, Sunninghill

DEA Reference Number: 12/12/20/2300

November 2014

Zitholele Project No: 12670

## FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

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## ABBREVIATIONS

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AWRD.....	Ash Water Return Dam
CA.....	Competent Authority
CO <sub>2</sub> .....	Carbon Dioxide
DMR .....	Department of Mineral Resources
DEA .....	Department of Environmental Affairs
DWS (Old DWA) .....	Department of Water and Sanitation
IEA.....	Integrated Environmental Authorisation
EAP .....	Environmental Assessment Practitioner
EIA.....	Environmental Impact Assessment
EIR.....	Environmental Impact Report
EM .....	Environmental Manager (Eskom)
EMPr.....	Environmental Management Plan / Programme
GCL .....	Geo-Synthetic Clay Liner
GIS .....	Geographic Information System
GNR.....	Government Notice Regulation
HDPE.....	High Density Polyethylene
I&APs.....	Interested and Affected Parties
IEM .....	Integrated Environmental Management
IEP .....	Integrated Energy Plan
kV .....	Kilo Volts
MAMSL.....	Meters above mean sea level
MVA.....	Mega Volt Ampere
NEMA .....	National Environmental Management Act
NEM:WA.....	National Environmental Management: Waste Act
NIRP .....	National Integrated Resource Plan
PM .....	Project Manager (Eskom)
PPP .....	Public Participation Process
QDGC.....	Quarter-Degree Grid Cell
RA.....	Regulating Authority
RO .....	Reverse Osmosis
SHEQO.....	Safety Health Environment Quality Officer
SO <sub>2</sub> .....	Sulphur Dioxide
TC.....	Total Concentration
ToR.....	Terms of Reference
WMLA.....	Waste Management License Application

## **PURPOSE OF THIS DOCUMENT**

Eskom is currently operating Camden Power Station as part of its electricity generation fleet. Throughout the operational life of the station, ash is generated at the station. This ash is being disposed of in an existing ash disposal facility within the Camden Power Station premises. The current ash disposal facilities have been providing disposal services since the establishment of the station (~47 years), and are reaching the end of their capacity. It has been established that a new ash disposal facility will be required to accommodate the remaining 17 years of operational life remaining.

To continue the practice of environmentally responsible ash disposal, this Environmental Impact Assessment (EIA) process is being undertaken, with the purpose of identifying, assessing, planning, and licensing the new ash disposal facility and its ancillary infrastructure. In order to comply with the necessary legal requirements of the National Environmental Management Waste Act (No 59 of 2008[NEM:WA]), the new ash disposal facility and associated structures must be appropriately designed and licensed, as ash disposal is a listed waste disposal activity. An integrated Environmental Impact Assessment (EIA) and Waste Management License Application process is being undertaken in line with the requirements of the EIA regulations promulgated under the National Environmental Management Act (No 107 of 1998 [NEMA]).

Eskom Holdings SOC Limited appointed Zitholele Consulting (Pty) Ltd, an independent environmental company, to conduct the EIA process required, to evaluate the potential environmental and social impacts of the proposed project, and undertake the necessary waste licensing processes.

The Draft Environmental Management Programme was submitted for public comment with the Draft Environmental Impact Report (Draft EIR). The stakeholder review period was from 14 March to 24 April 2013. Comments received as well as changes to the project were then included in the Revised DEMPr which was again made available for public review together with the RDEIR from 29 September to 10 November 2014.

This report, the FEMP is being submitted to the DEA. Any comments that you might have must be directed to the DEA.

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## **1. BACKGROUND INFORMATION**

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### **1.1 WHO IS THE PROPONENT?**

Eskom Holdings SOC (Ltd) is the main 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.

### **1.2 CAMDEN ASH DISPOSAL FACILITY PROJECT**

Eskom is currently operating Camden Power Station as part of its electricity generation fleet. The first of its eight units of the Camden Power Station were commissioned in 1967. Half of the station was mothballed in 1988 with the rest of the station following suit in 1990. A decision was however made in 2003 to re-commission the Camden Power Station. Throughout the operational life of the station, ash is generated. This ash is being disposed of in an existing ash disposal facility within the Camden Power Station premises.

The current ash disposal facilities have been providing disposal services for the last 47 years. The increasing national demand for electricity necessitated the re-commissioning of the Camden Power Station in 2005. The re-commissioning of the Camden Power Station allowed for the capitalisation of the production capacity of the power station, thereby contributing to meeting the increased electricity demand. The remaining capacity of the existing Ash Disposal Facility is however not be adequate to cater for the remaining extended operational life of the Camden Power Station. Furthermore it is anticipated that the remaining capacity of the existing Ash Disposal Facility allows for ashing continuing until January 2017, after which an additional ADF will be required.

In order to establish a new ash disposal site within close proximity to the power station property and the current ashing site, a site selection exercise was undertaken in line with the Minimum Requirements for the Disposal of Waste by Landfill (both the 2nd Edition (1998)<sup>1</sup> and the Draft 3rd edition (2005)<sup>2</sup> were taken into account during the identification of the most feasible site alternatives, and design of the facility). Potential locations for the new Ash Disposal Facility were identified using the following criteria:

- Ability to link into existing ash disposal facilities;
- Must be within a 10 km radius from the existing disposal site and its associated facilities; and

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<sup>1</sup> Department of Water Affairs & Forestry (DWAF), (1998) *Waste Management Series. Minimum Requirements for Waste Disposal by Landfill*, 2<sup>nd</sup> Ed, Government Printer, Pretoria.

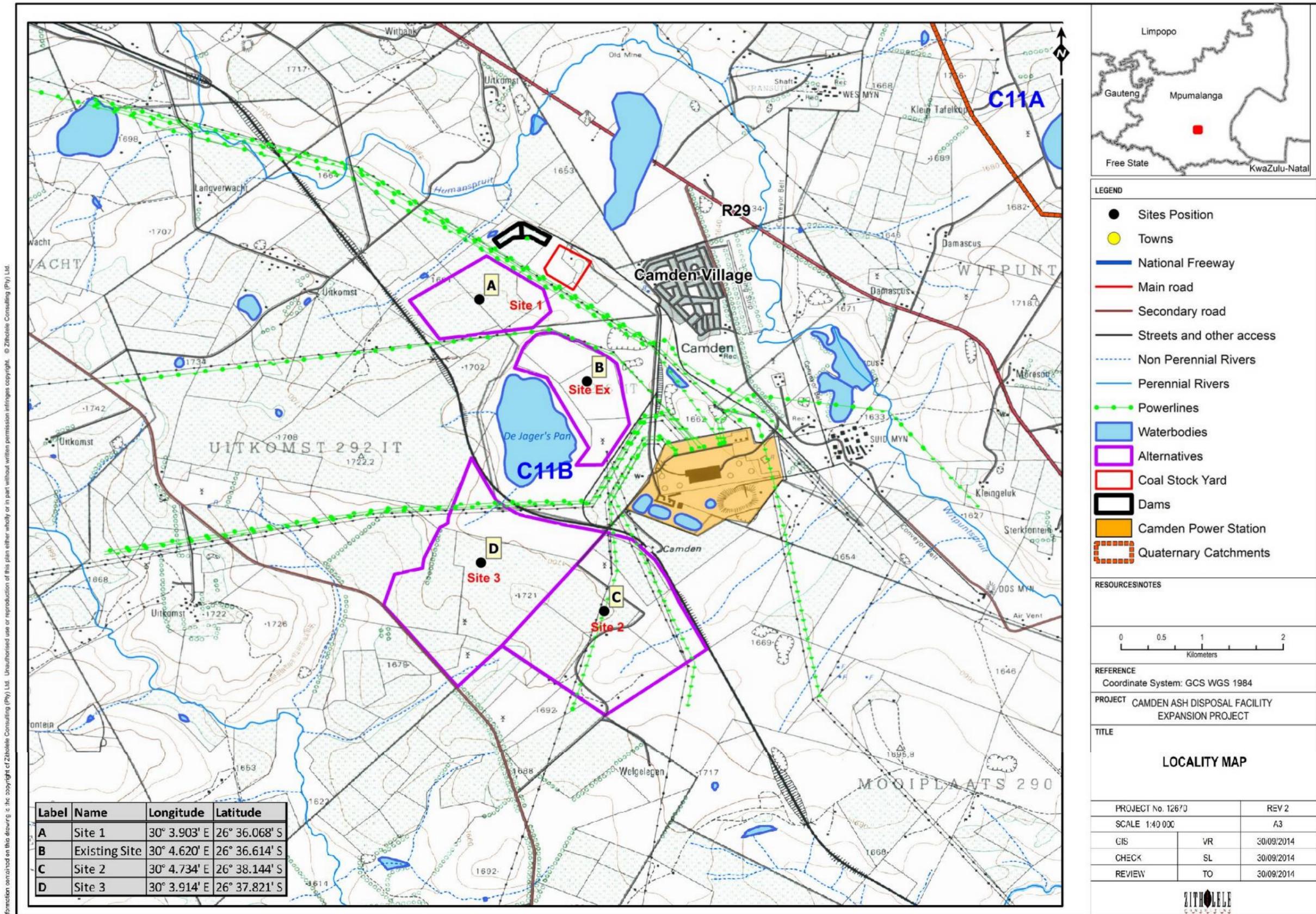
<sup>2</sup>DWAF, (2005) *Waste Management Series. Minimum Requirements for Waste Disposal by Landfill*, Draft 3rd Ed, Government Printer, Pretoria

- Must have a minimum footprint area of 120 hectares.

The new ash disposal facility will need to cater for an estimated 25 million m<sup>3</sup> of ash up to 2033. It is anticipated that additional structures/ancillary infrastructure will include inter alia Ash Water Return Dams (AWRD) and channels, pipelines, roads, and fences.

### **1.3 PROJECT LOCATION**

The proposed project area is located adjacent to the Camden Power Station which is approximately 15km South East of the Ermelo in the Mpumalanga Province. The area is within the boundaries of the Msukaligwa Local Municipality in the Gert Sibande District Municipality, refer to the project locality map shown in Figure 1-1. The current ash disposal facility is named "Site Ex".



Information contained on this drawing is the copyright of Zitholele Consulting (Pty) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Zitholele Consulting (Pty) Ltd.

Z:\Projects\1257C - EIA for ash disposal facilities at Camden Power Station\Drawings\MXD\Revised DEIR Maps\12670-77-Map-002-Locality Map-Rev2-25 August 2014.mxd

Figure 1-1: Location of the Camden Ash Disposal Facility Project

## 1.4 CONTEXT OF THIS REPORT

This report is the Final Environmental Management Programme (Final EMPr), and must be read in conjunction with the Final Environmental Impact Report (Final EIR) and its respective appendices.

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 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 start up (site clearing, erection of the construction camp), and to those incurred during operation. Specifically, the objectives of this EMPr can be articulated as follows:

- To give effect to the construction related requirements;
- To give effect to the environmental commitments to 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 construction phase of 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 Final EMPr for the construction and operation of the Camden Power Station Ash Disposal Facility. This Final EMPr has been compiled according to the findings of the environmental impact assessment, and is included as an appendix to the Final EIR for consultation purpose. The Final EMPr will accompany the EIR which will

submitted to the authorities for consideration. The Final EMPr will be published as a standalone document for ease of use (attached as Appendix R in the EIR)

## **1.5 ENVIRONMENTAL IMPACT ASSESSMENT PRACTITIONER (EAP) DETAILS**

In terms of the NEMA and associated Environmental Impact Assessment (EIA) Regulations (2010), the proponent must appoint an Environmental Assessment Practitioner (EAP) to undertake the environmental assessment of an activity regulated in terms of the aforementioned Act.

In this regard, Eskom appointed Zitholele Consulting to undertake the EIA for the proposed Camden Power Station Ash Disposal Facility Project, in accordance with the EIA Regulations promulgated and amended in June 2010 in terms of the NEMA. This process also complies with the NEM:WA requirements for licensing of waste disposal facilities as the proposed activity is listed in the waste regulations (GNR 921 Category B of November 2013).

Zitholele Consulting 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 EAP representatives are listed below, refer to Appendix A for a copy of her *curricula vitae*.

Sharon Meyer Douglas, MSc. Biological Control / Env Education, Zoology, 2007 University of the Witwatersrand

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Sharon Meyer Douglas is the designated Project Director on behalf of Zitholele. Sharon Meyer Douglas has ensured regulatory compliance, quality assurance and overseeing of the Technical Environmental Team. Sharon has 14 years' experience in the environmental consulting field, managing environmental authorisation and licensing processes throughout a range of industries; including power supply, mining operations, foundries, and property developments. She is ideally skilled and experienced to manage this project to its conclusion.

## 1.6 LEGAL CONTEXT

A detailed account of all environmental legislation including specific Environmental Management Acts which have a bearing on the proposed Camden Power Station is provided in **Chapter 2** of the Final Environmental Impact Report (Revised FEIR). This demur must be read along with the RFEIR. Specific provisions which are included in Regulation 33 of the Environmental Impact Assessment (EIA) Regulations 2010 (R.543) relating to the contents of an EMPr is provided in **Table 0-1**. Although the EMPr is a living document and should be continually updated and improved, any amendments which are made to the approved document must be done in accordance with Regulation 46 of the EIA Regulations 2010 (R.543).

It should be noted 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 0-1: Document Roadmap.**

<b>DOCUMENT ROADMAP</b>		
<b>Regulation 33 of the EIA Regulations (2010)</b>	<b>Description of Regulation</b>	<b>Relevant chapter of document</b>
Regulation 33(a)	details of –  (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Chapter 1.5
Regulation 33(b)	information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of— planning and design; pre-construction and construction activities; operation or undertaking of the activity; rehabilitation of the environment; and closure, where relevant.	Chapter 8
Regulation 33(c)	a detailed description of the aspects of the activity that are covered by the final environmental management programme;	Chapter 2
Regulation 33(d)	an identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);	Chapter 7.2

<b>DOCUMENT ROADMAP</b>		
<b>Regulation 33 of the EIA Regulations (2010)</b>	<b>Description of Regulation</b>	<b>Relevant chapter of document</b>
Regulation 33(e)	proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;	Chapter 8
Regulation 33(f)	as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;	Chapter 2.12 and 8
Regulation 33(g)	a description of the manner in which it intends to— modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; remedy the cause of pollution or degradation and migration of pollutants; comply with any prescribed environmental management standards or practices; comply with any applicable provisions of the Act regarding closure, where applicable; comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Chapter 8
Regulation 33(h)	time periods within which the measures contemplated in the environmental management programme must be implemented;	Chapter 8
Regulation 33(i)	the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;	Chapter 8
Regulation 33(j)	an environmental awareness plan describing the manner in which— the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment;	Chapter 3 and 6.3
Regulation 33(k)	Where appropriate, closure plans, including closure objectives.	Chapter 8

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## **2. PROJECT DESCRIPTION**

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The proposed project is the construction and operation of a new Ash Disposal Facility (ADF) and associated infrastructure for the Camden Power Station. A detailed description of the project components is given in this section.

### **2.1 PROJECT COMPONENTS AND LAYOUT**

It is envisaged that the Camden Ash Disposal Facility project will consist of the following components:

- A suitably designed and lined ash containment facility (wet facility) able to accommodate the ~17 years of ash still to be generated by Camden Power Station;
- Clean and dirty water separation and containment facilities, including:
- Ash Water Return Dams (AWRD) and trenches / drains;
- Storm water drainage canals and discharge; and
- Monitoring boreholes;
- Pipelines for the transportation of ash slurry to the disposal facility (containment dam);
- Access roads around the facility, fencing around the facility and access control;
- Rehabilitation of redundant infrastructure.

A site layout plan is included below as Figure 2-1.

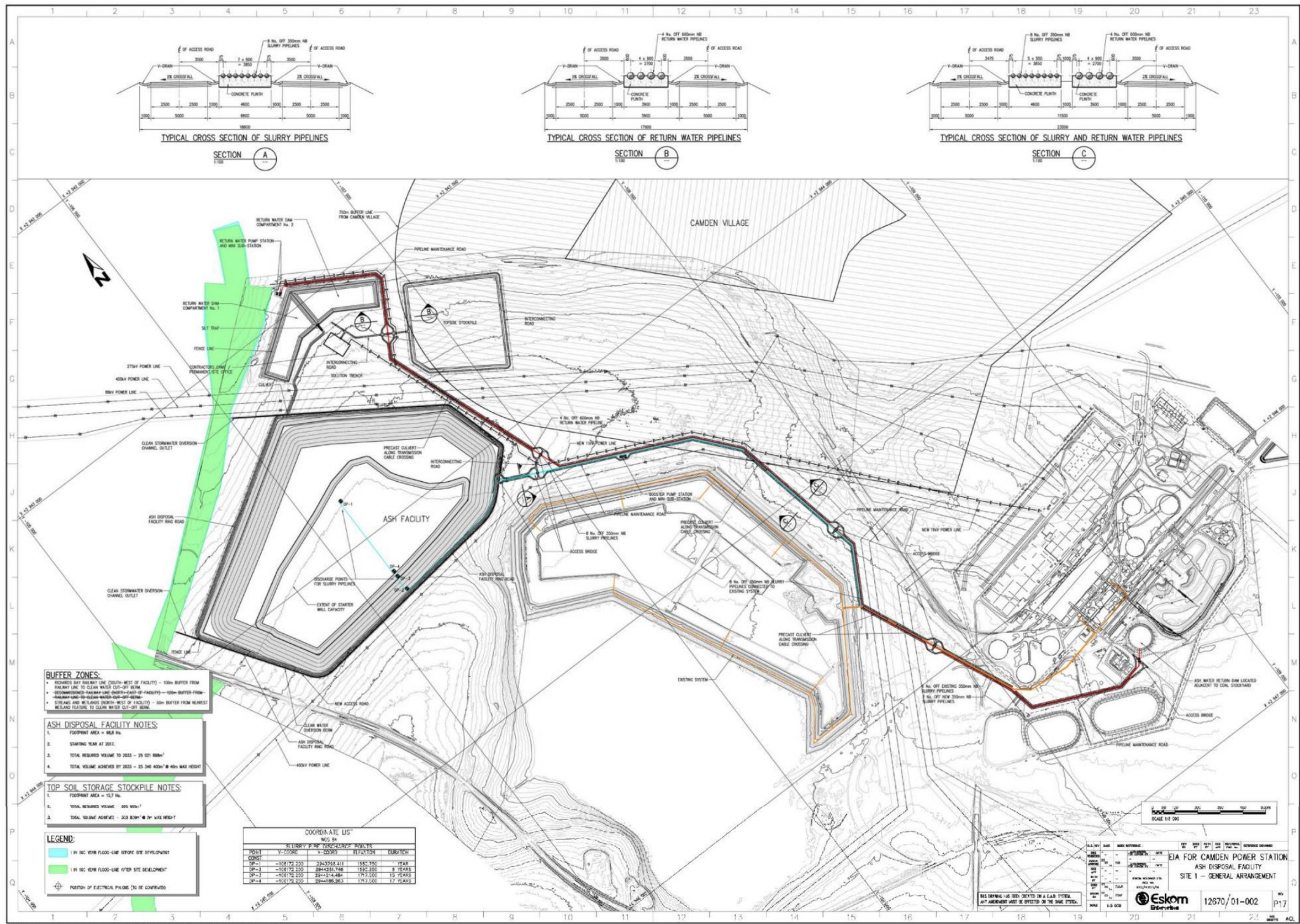


Figure 2-1: Camden Ash Disposal Facility Expansion Project Layout Map

## **2.2 FOOTPRINT AND LIFESPAN OF THE FACILITY**

The new ash disposal facility will need to cater for an estimated 25 million m<sup>3</sup> of ash up to 2033. Additional structures *inter alia* AWRD and channels, roads, pipelines and fences will also increase the footprint of the project.

## **2.3 HEIGHT OF THE FACILITY**

According to Eskom policy the height of a facility and the rate of rise are critical to ensure that an ash disposal facility is operated safely and efficiently. It is envisaged that the rate of rise will not exceed the current 3.5m per annum. The new facility will be ~40m high at its highest point once fully constructed.

## **2.4 SOURCES OF WASTE**

The waste that requires disposal on the ash disposal facilities originates from two main sources:

- Camden Power Station: fly ash and coarse ash from coal burning operations (this currently contains blow down water from the cooling towers, which is used to transport the ash); and
- Camden Power Station Reverse Osmosis (RO) / ash water treatment plant: effluent salts/concentrated ash return water.

The ash and effluent received by the current ash disposal facilities is transported via pipelines to the ash disposal facility from the various source areas.

## **2.5 VOLUMES OF WASTE**

### **2.5.1 Ash Volumes**

The volumes of ash vary from month-to-month, however a detailed register of all the ash disposed at the existing facility is kept at the power station. The current site is authorised to receive a maximum of 3 421 000 m<sup>3</sup> of slurry a year. It is anticipated that the new site will have to take the same consistency and composition of ash for the estimated life of the facility, which is estimated for another 17 years from 2017 to 2033.

### **2.5.2 RO Plant Effluent Volumes**

Once the treatment plant is operational at 85% recovery rate, it will produce ~500 m<sup>3</sup> of effluent per day. This volume of effluent waste stream is considered negligible at 5% of the total waste stream per annum to be disposed of on the proposed ash disposal facility, and will only constitute a total of 4.25% of the total waste stream over the 17 year life of the facility.



The liner system also calls for a 300mm clay layer. Testing will be conducted on the ADF footprint on Site 1 to determine the permeability of the compacted *in situ* soils. DWS have indicated that if the permeability is less than  $10^{-5}$ cm per second then the *in situ* soils may be used instead of the clay layer, however the 1.5mm thick HDPE liner must be increased to 2mm thick. Importation of clay is possible, however, may not be economically viable.

### 2.6.1 Liner installation

The total footprint area of the new ADF on Site 1 is approximately 99Ha. The construction of the liner may be phased to a certain extent taking into account the rate of growth of the footprint area of the new ADF. The footprint area required for the first year of ash disposal will be approximately 54.2Ha, which is more than half of the total footprint area. This is indicated by the red contours in the figure below. The entire site must be lined before the fifth year of ash disposal commences. The new ADF will reach a level of 1688m above mean sea level and a total height of 16.25m above the toe of the starter wall in the beginning of the fifth year of ash disposal.

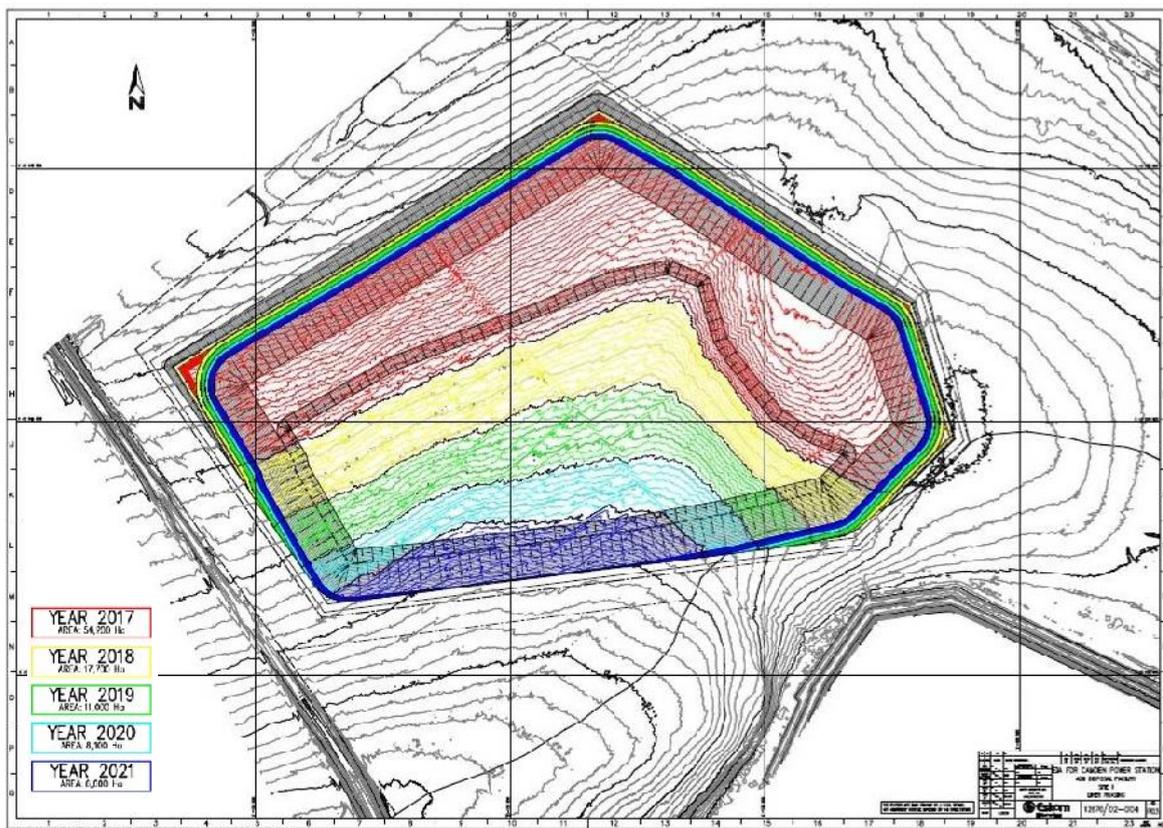


Figure 2-3: Lining requirements for the first five (5) years of ash disposal

## 2.7 CLEAN WATER SEPARATION INFRASTRUCTURE

An upstream lined channel shall be constructed to divert clean water around the proposed facility and discharge into the natural environment. The channel will be sized to accommodate the 1 in 100 year storm event. Each site is positioned such that the area between the natural watershed and the proposed facility that is not impacted by ash is a minimum. The proposed sizes of the trapezoidal channels, with side slopes of 3:2 (h:v) and base width of 1m, required are listed in the table below. The clean water diversion channels for Site 1 are shown on Drawing Number 12670-02-002. Reference: Appendix C: Conceptual Engineering Drawings.

**Table 2-2: Sizing of Clean Water Diversion Trench**

Site	Channel ID	"Clean" Area (ha)	Flow Rate (m <sup>3</sup> /s)	Channel Length (m)	Slope (%)	Channel Height (mm)	Channel Top Width (mm)
1	1	15.8	2.4	450	0.78	500	2500
1	2	5.6	0.833	623	1.18	260	1800
1	3	6.0	0.9	295	0.78	300	1900
1	4	6.0	0.9	306	0.76	300	1900
1	5	23.4	3.5	590	2.00	480	2400
3A	1	13.1	10.1	1700	3.69	700	3100
3B	1	28.2	11.4	1800	4.71	700	3100
3B	2	27.5	10.4	1200	3.92	700	3100

## 2.8 DIRTY WATER CONTAINMENT INFRASTRUCTURE

### Solution trench

Dirty water run-off generated off the side slopes will drain into a suitably sized "solution trench" running around the facility. These trenches will be designed to receive and convey run-off generated after a 100 year storm event. The solution trenches will also receive discharge from the leachate collection system and this flow will also be required to be included in its sizing. Conceptual sizes of the trapezoidal channels, with side slopes of 3:2 (h:v) and base width of 1m, required are listed in the table below. The dirty water diversion channels for Site 1 are shown on Drawing Number 12670-02-002. Reference: Appendix C: Conceptual Engineering Drawings.

**Table 2-3: Sizing of Solution Trenches**

Site No	Channel ID	Flow Rate (m <sup>3</sup> /s)	Channel Length (m)	Channel Slope (%)	Channel Height (mm)	Channel Top Width (mm)
1	A	33	450	0.78	1800	6400
1	B	33	590	2.00	1500	5500
1	C	33	1,021	0.59	1900	6700
1	D	33	623	1.18	1600	5800
1	E	33	295	0.78	1800	6400

Site No	Channel ID	Flow Rate (m <sup>3</sup> /s)	Channel Length (m)	Channel Slope (%)	Channel Height (mm)	Channel Top Width (mm)
1	F	33	306	0.76	1800	6400
1	G	33	753	1.11	1600	5800
3A	A	6.3	1,700	5.51	500	2,500
3A	B	13.7	800	3.92	800	3,400
3A	C	5.9	580	4.83	500	2,500
3A	D	3.4	730	1.60	500	2,500
3B	A	7.5	1,300	3.80	600	2,800
3B	B	2.6	400	2.21	400	2,200
3B	C	6.6	700	2.94	600	2,800
3B	D	16.9	1,150	3.64	900	3,700
3B	E	22.9	570	4.26	1,000	4,000
3B	F	10.5	350	3.99	700	3,100

### Leachate Collection

The leachate collection system will comprise of a toe drain as well as a main drain system. A leachate collection system will be designed such that a maximum leachate head of 300mm will be maintained over the liner system. The leachate will be drained to the solution trench, discussed below, which ultimately discharges to the New AWRD.

The leachate collection system will be designed using a 160mm geopipe covered with 19mm stone wrapped with Grade A4 bidim. This will be located above the liner system. The permeability, as discussed in a previous section, varies between 3 to 20m per year. Based on this, a conservative drainage rate of 5mm/h was assumed in order to determine spacing of the geopipe for the leachate collection system. Conceptual flows draining to the new AWRD via the solution trenches indicated in the previous section is indicated in the table below:

**Table 2-4: Leachate Flow Rates**

Site No	Max Area for Leachate (ha)	Flow Rate (m <sup>3</sup> /s)
1	99	1.4
3A	101	1.4
3B	92	1.3

### New Ash Water Return Dam (AWRD)

The leachate collection system will comprise of a toe drain as well as a main drain system. A leachate collection system will be designed such that a maximum leachate head of 300mm will be maintained over the liner system. The leachate will be drained to the solution trench, discussed below, which ultimately discharges to the New AWRD.

The leachate collection system will be designed using a 160mm geopipe covered with 19mm stone wrapped with Grade A4 bidim. This will be located above the liner system. The permeability, as discussed in a previous section, varies between 3 to 20m per year. Based on this, a conservative drainage rate of 5mm/h was assumed in order to determine spacing of the geopipe for the leachate collection system. Conceptual flows draining to the new AWRD via the solution trenches indicated in the previous section is indicated in the table below:

**Table 2-5: Leachate Flow Rates**

Site No	Max Area for Leachate (ha)	Flow Rate (m <sup>3</sup> /s)
1	99	1.4
3A	101	1.4
3B	92	1.3

## 2.9 PIPELINES

### 2.9.1 Slurry pipelines

Currently six 300NB slurry pipelines leave the existing ash sumps located on the power station terrace to the existing ADF. The six existing 300NB pipelines will be replaced with six 350NB pipelines. Two additional 350NB steel pipelines will be installed parallel to the six replaced pipelines from the existing ash sumps to the take-off point to the new ADF. The pipelines will be extended from the existing pipeline route to the new facility by 350NB steel pipelines. Eight pipelines are required in total, with six operational at any given time. The pipelines will convey 950m<sup>3</sup>/hr each. All pipelines will be installed above surface and fixed to concrete plinths. A booster pump station, accommodating eight pumps and having an estimated footprint area of 100m<sup>2</sup>, will be constructed at chainage position 3000m from the power station. The length of the new pipelines is approximately 3.0km each. The two new steel pipelines constructed parallel to the six existing pipelines from the ash sumps to the take-off (T-off) point is approximately 1.5km in length each. The placement of these pipelines is shown on Figure 2-1.

### **2.9.2 Ash Water return water pipelines**

The existing return water pipeline from De Jagers Pan will need to remain in place after the existing facility has reached its design capacity. This will be required in order to manage storm water that either runs off the contaminated terrain and side slopes of the facility or any storm water that recharges through the facility before it is capped. New return water pipelines, four (number) in total, will need to be constructed from the new AWRD back to the existing AWRD at the power station. New 600mm NB steel pipelines, approximately 4.8km long, is proposed for the ash water return pipeline. The pipeline will be installed above surface and fixed to concrete plinths. A total combined flow of 2100m<sup>3</sup> per hour will be conveyed by these pipelines to the existing AWRD located on the power station terrace. The pumps for these pipelines will be located within a new pump station located adjacent to the new AWRD and will be able to accommodate seven pumps, four duty and three standby. A mini electrical sub-station will also be accommodated adjacent to the pump station. Both the pump station and the mini sub-station will cover a footprint area of approximately 100m<sup>2</sup>.

The set of pipelines will have five metre wide access roads on either side for its entire length. This will facilitate maintenance of the pipelines. These roads will also serve as the access roads to the New ADF and to the new AWRD.

### **2.10 SITE ACCESS AND ROADS**

The site will be accessed via extensions to the existing roads. An access road exists on the eastern side of the existing ADF and a road leads to the AWRD (to the west of it). The roads are gravel and are in fair condition. It is proposed to link the new roads to the existing roads. A 5m step-in is proposed on the ADF for vehicular access. A gravel base with a stabilised wearing course is proposed for the site access roads. All accesses to the new facility will be fully secured by means of 1.8m high diamond mesh fencing.

### **2.11 CONTRACTOR'S CAMP**

The contractor's camp will be located within the site. The contractor's camp will be for:

- The location of the contractors site office and first aid station (containers, park-homes or similar type structure that can be removed will be used);
- Parking of vehicles (including heavy vehicles for construction purposes);
- Storage of equipment and construction materials;
- Safe storage of dangerous goods (including hydrocarbons and chemicals that may be required during construction, that will be stored in properly designed, ventilated, secured, and bonded storage facilities);
- Storage of potable water (a juju tank or similar type temporary structure of about ~2000 litres will be installed for the duration of the construction phase); and

- Temporary ablution facilities will be established that consist of portable toilets or a conservancy tank will be used.

This contractor's camp will be used for the life of the facility and only decommissioned and rehabilitated once the entire ash disposal facility is finally rehabilitated.

## **2.12 REHABILITATION**

Generally the New ADF will be rehabilitated by the placing of a 300mm thick layer of topsoil on top of the facility and the planting of indigenous grass.

## **2.13 STORM WATER MANAGEMENT**

Clean water and dirty water will be separated for the New ADF and the New AWRD. Clean water will be discharged into the environment, while dirty water will be contained, silt will be removed and then the dirty water will be recycled and re-used for slurry make up water at the Camden Power Station. This is all in accordance with Government Notice 704. Clean water diversion channels will be provided around the New ADF and the New AWRD to prevent clean water from entering the dirty water system. Clean water diversion channels are however not required all around the new facilities, but just where clean water will gravitate naturally towards the dirty areas. In other areas clean water will naturally gravitate away from the dirty areas. The clean water diversion channels will be lined (with HDPE) to prevent ingress into the groundwater below the New ADF. This is done to prevent clean water from entering the facility.

Dirty water diversion channels (or solution trenches) will completely surround the New ADF to prevent dirty water from polluting the environment. Dirty surface water runoff, leachate and overflow from the pool on top of the New ADF will all report to the dirty water diversion channels. The dirty water will gravitate along the lined dirty water channels to the silt traps at the inlet into the New AWRD. After silt has settled out, the dirty water will flow into the lined New AWRD, therefore contained and prevented from polluting the environment. The New AWRD is sized not to spill more than once in 50 years as discussed in Section 5 of the engineering design report. The dirty water will then be pumped from the New AWRD back to the existing AWRR to be re-used as ash slurry water at the Camden Power Station

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### 3. IDENTIFIED IMPACT RISKS

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A more detailed assessment of the impact risks can be obtained in the EIR for the project. Presented below is a summary of the risks per project phase.

#### 3.1.1 Construction Phase

The most significant impact risk to the environment from the Camden Ash Disposal Facility expansion project (without mitigation measures), during the construction phase, will be to the Topography, Surface Water and Wetlands Resources, and existing infrastructure. This can be explained as follows:

- **Topography:** permanent alternation of surface water drainage patterns;
- **Surface Water and Wetlands:** potential for increased suspended solids and sedimentation of surface water resources from construction activities, decreased recharge of surface water resources from alterations of topography, and installation of a barrier system to prevent water from leaving the ash disposal facility area of the development site; and
- **Site 1 is located ~750m from the Camden Village**, a sensitive receptor in the area. The distance is based on a screening assessment assuming a worst case scenario. The village should be adequately protected if mitigation measures are successful, however monitoring should be undertaken to ensure that the impacts are within acceptable limits; and
- **Fauna and Flora:** The initial impacts to biodiversity include extensive grazing, cultivation and alien invasive colonisation. The initial impact to fauna and flora is definitely **MODERATE** negative impact acting over the long term, and is presently occurring in the local area.

The only residual impacts that are still HIGH after the construction phase is complete are the Geological, Topographic, Groundwater, and Visual impacts. This is as a result of the already highly impacted receiving environment. The project will not increase the significance of these existing impacts, but mitigation measures cannot reduce these impacts either.

#### 3.1.2 Operational Phase

The most significant risk to the environment from the Camden Ash Disposal Facility Expansion project (without mitigation measures), during the operational phase, will be to the Soil and Land Capability, and groundwater environment. This can be explained as follows:

- **Soil and Land Capability:** leachate will form below the facility and will pollute soil resources; and

- **Air Quality:** particulates may be mobilised, especially during high windfall events, that may impact on the surrounding study area; and
- **Groundwater, Surface Water and Wetlands:** any leachate draining from the facility will percolate through soil and into groundwater resources, but the facility will have an appropriate barrier system.

### 3.1.3 Decommissioning Phase

The most significant risk to the environment from the Camden Ash Disposal Facility Expansion project (without mitigation measures), during the closure phase, will be to the Groundwater and Visual elements of the receiving environment. This can be explained as follows:

- **Visual Environment:** capping and vegetation of the dam will have a positive impact;
- **Groundwater:** any leachate draining from the facility will percolate through soil and into groundwater resources; and

Closure activities will have a positive impact on the environment, although the residual impact in almost all cases remains negative. This is as a result of the already high baseline impacts that mitigation measures specific to this project will not reduce.

### 3.1.4 Post Closure Phase

The most significant risk to the environment from the Camden Ash Disposal Facility Expansion project (without mitigation measures), during the post closure phase, will be to the Groundwater and Visual elements of the receiving environment. This can be explained as follows:

- **Soil and Land Capability:** any leachate will form below the facility and will pollute soil resources; and
- **Groundwater:** the leachate draining from the facility will percolate through soil and into groundwater resources;

## 3.2 IMPACT MITIGATION

Unmitigated project impact risks to the soil and land capability, surface water and groundwater environment would be unacceptable if not mitigated. Fortunately these impacts can be mitigated. With mitigation measures implemented at Site 1 all impacts can be reduced to within acceptable limits. Mitigation measures identified are relatively well understood, and with the exception of the installation of a liner system below the dirty water facilities (such as the Ash Disposal Facility and Ash Water Return Dam), the mitigation measures are relatively inexpensive to implement.

The approach to impact mitigation utilised is as follows:

**Avoid:** during project planning and design avoid impacts by considering alternatives. Several alternatives were considered and comparative assessments were done to select the preferred site. The design of the finally selected alternative was optimised through several design iterations to reduce or avoid impacts where possible. Refer to the EIR for more information if required.

**Mitigate:** where impacts cannot be entirely avoided, mitigation strategies / management measures are to be implemented to reduce the impact significance, duration, spatial extent or probability of the impact occurring. These mitigation / management measures are documented in the EMPr (this report).

**Monitoring:** a monitoring programme is contained within this EMPr to establish what the extent of impacts are, the success of mitigation measures, and to determine if further management / mitigation measures are required. The process of Environmental Management is intended to be dynamic, and response to the environment and impacts that occur during the execution of the project.

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## **4. MONITORING**

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### **4.1 SURFACE AND GROUND- WATER MONITORING**

Camden Power Station undertakes routine water quality monitoring, which is currently outsourced to an independent consultancy (GHT, 2014). The monitoring sites at Camden Power Station have been classified according to their location relative to the infrastructure and natural streams or drainage systems in the environment. All the activities at Camden Power Station drains along three small streams towards one major stream, the Witpunt Spruit, east of the power station. The Witpunt Spruit drains into the Vaal River approximately 5km downstream from the power station. These three effected sub drainage and one major drainage systems or streams are described as follows:

- Sub Drainage System 1: Witpunt Spruit Northern Tributary
  - Ash Dam Complex Eastern Drainage System
  - Power Station Area North-western Drainage System
  - SANDF Village Area South-eastern Drainage System
- Sub Drainage System 2: Witpunt Spruit Central Tributary
  - Power Station Area North-eastern Drainage System
- Sub Drainage System 3: Witpunt Spruit Southern Tributary
  - Power Station Area - Eastern Drainage System
  - Coal Stock Yard Area – Southern and Eastern Drainage Systems
- Major Drainage System 1: Witpunt Spruit
  - Witpunt Spruit East of Power Station
  - Vaal River approximately 5km downstream from Power Station

Nine different types of monitoring sites were identified. These different types of monitoring sites are:

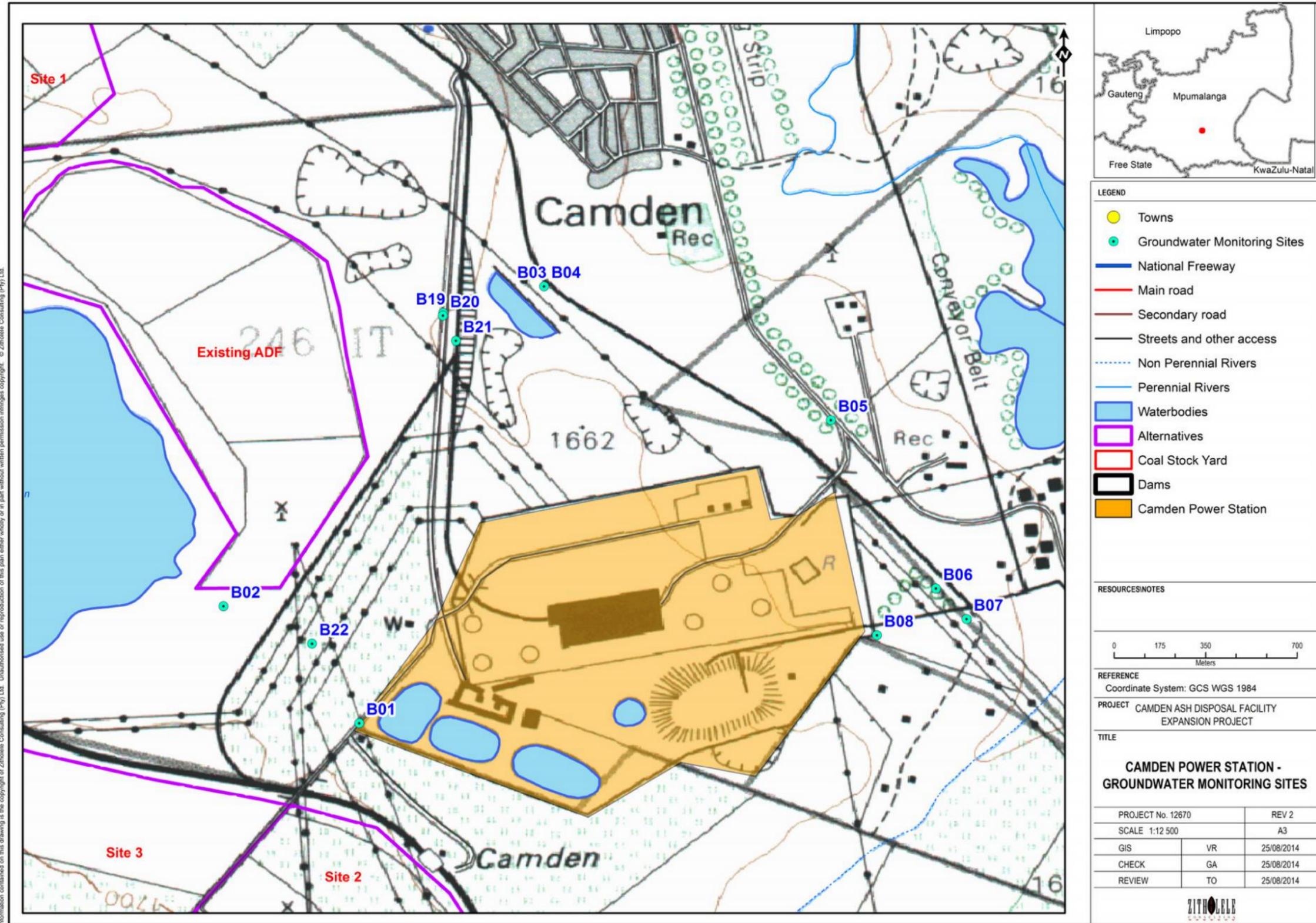
- Groundwater sites (labelled B),
- River or natural stream sites (labelled R),
- Canal or trench sites (labelled C),
- Sewage effluent or discharge sites (labelled K),
- Pan or dam sites (labelled P),
- Seepage sites (labelled S),
- Sump sites (labelled T),

- Auger holes and Dugged trenches (labelled D) and
- Other sites (labelled Z).

Refer to Figure 4-2 for a map of the existing monitoring points for Surface Water and to Figure 4-1 for a map of the groundwater monitoring points.

Camden Power Station should continue to monitoring the existing sampling points to determine the direction of pollution plume and incorporate mitigation measures. New sampling positions should be identified, by a specialist, for the new facility. The new monitoring positions should take in consideration the specialist studies conducted during the EIA process. These points need to be sited in such a way as to ensure that they are not damaged or destroyed during construction.

Camden Power Station should incorporate the new sampling points into the Camden Power Station water monitoring plan and ensure that these points are sampled prior to construction to ensure a proper baseline is determined. The extended sampling network shall ensure proper monitoring of the plume at the new and existing facility and will provide valuable information for rehabilitation and mitigation.



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Figure 4-1: Existing Groundwater Monitoring Network

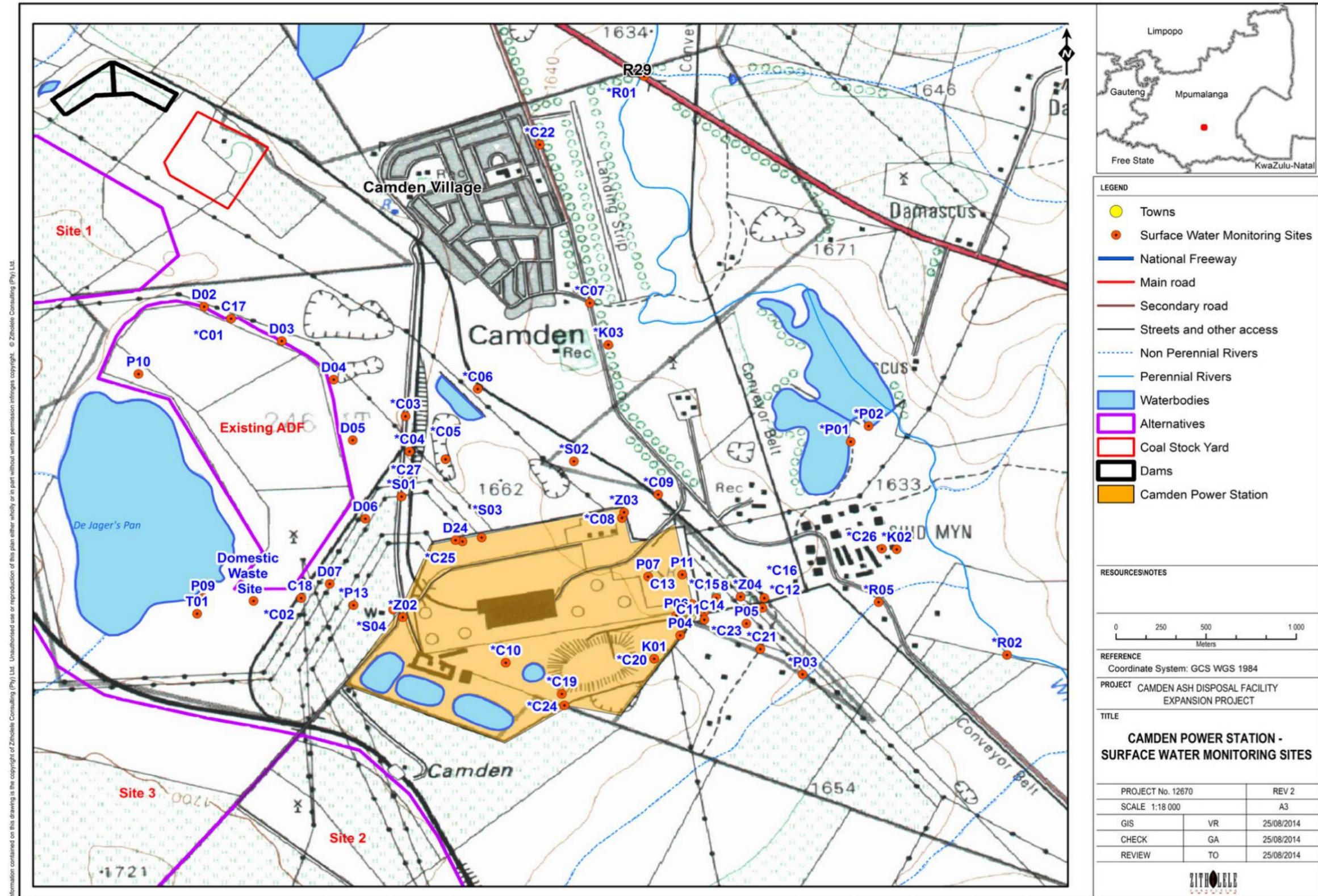


Figure 4-2 : Existing Surface Water Monitoring Network

## 4.2 BIOMONITORING

There is currently no routine biomonitoring programme in place at Camden Power Station, although aquatic biomonitoring studies have been undertaken on the site over the last few years. It is therefore recommended that a monitoring program of the adjacent wetland and aquatic ecosystem be implemented. These studies must consider results from the surface water monitoring, which must take cognisance of the pH and TDS. Monitoring of the receiving environment should consider sites on the Humanspruit and Witpunt Spruit. *In situ* water quality measurements should not exceed the South African Water Quality Guidelines and ecological integrity should not differ from background values. Monitoring should be conducted bi-annually during the wet and dry season. Proposed monitoring points are shown below as per **Table 4-1** and **Figure 4-3**

**Table 4-1: Proposed bio-monitoring positions**

Site	Symbol ID	Y_Lat	X_Long
1	Biomonitoring	-26.58741	30.044781
2	Biomonitoring	-26.579381	30.072338
3	Biomonitoring	-26.565223	30.078569
4	Biomonitoring	-26.593176	30.0961
5	Biomonitoring	-26.623751	30.11633
6	Toxicity Testing	-26.622337	30.068748
7	Toxicity Testing	-26.591264	30.067908
8	Toxicity Testing	-26.605816	30.093452
9	Toxicity Testing	-26.614652	30.09796
10	Toxicity Testing	-26.620406	30.107813

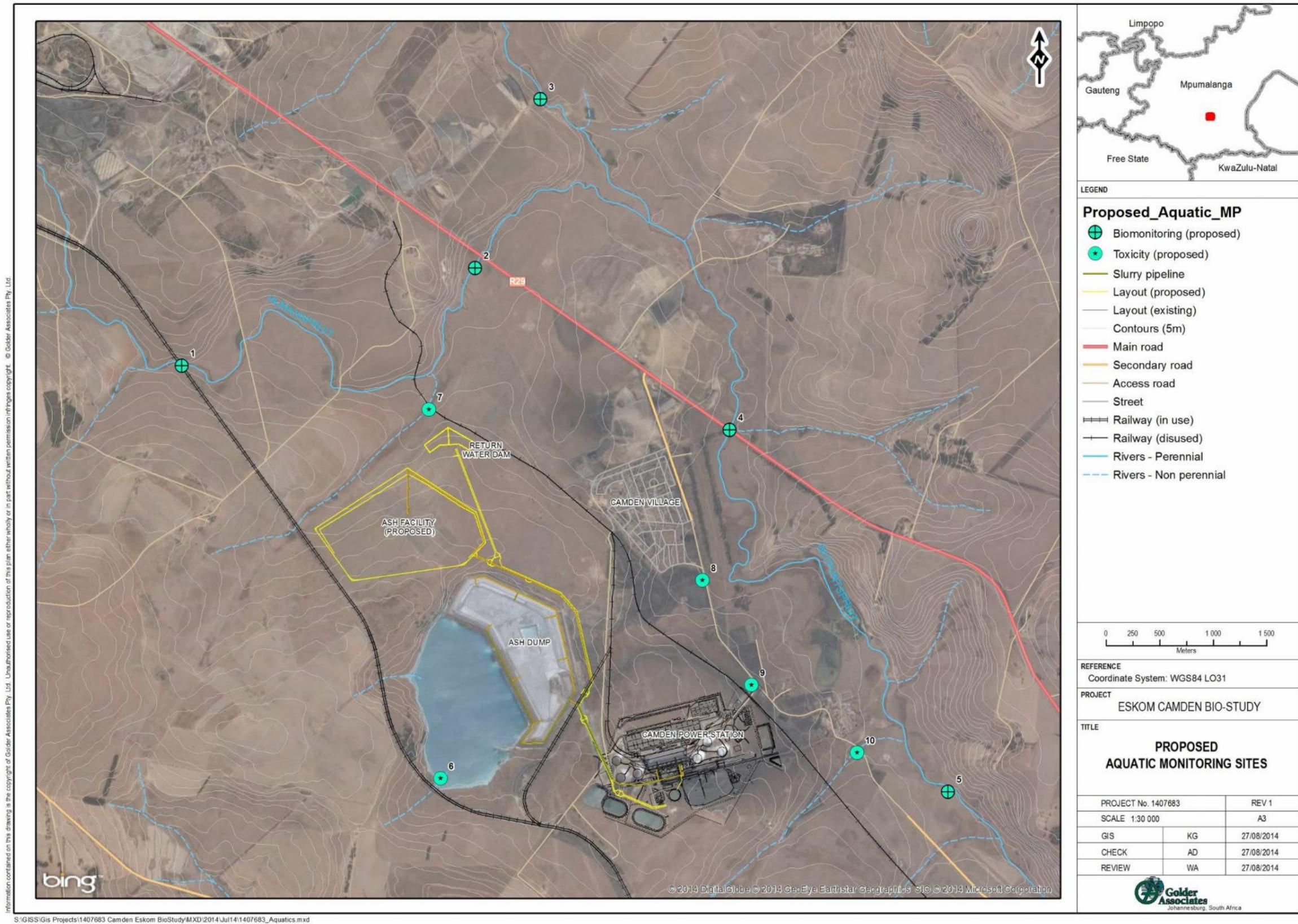


Figure 4-3 : Proposed Bio-monitoring network

### 4.3 AIR QUALITY MONITORING

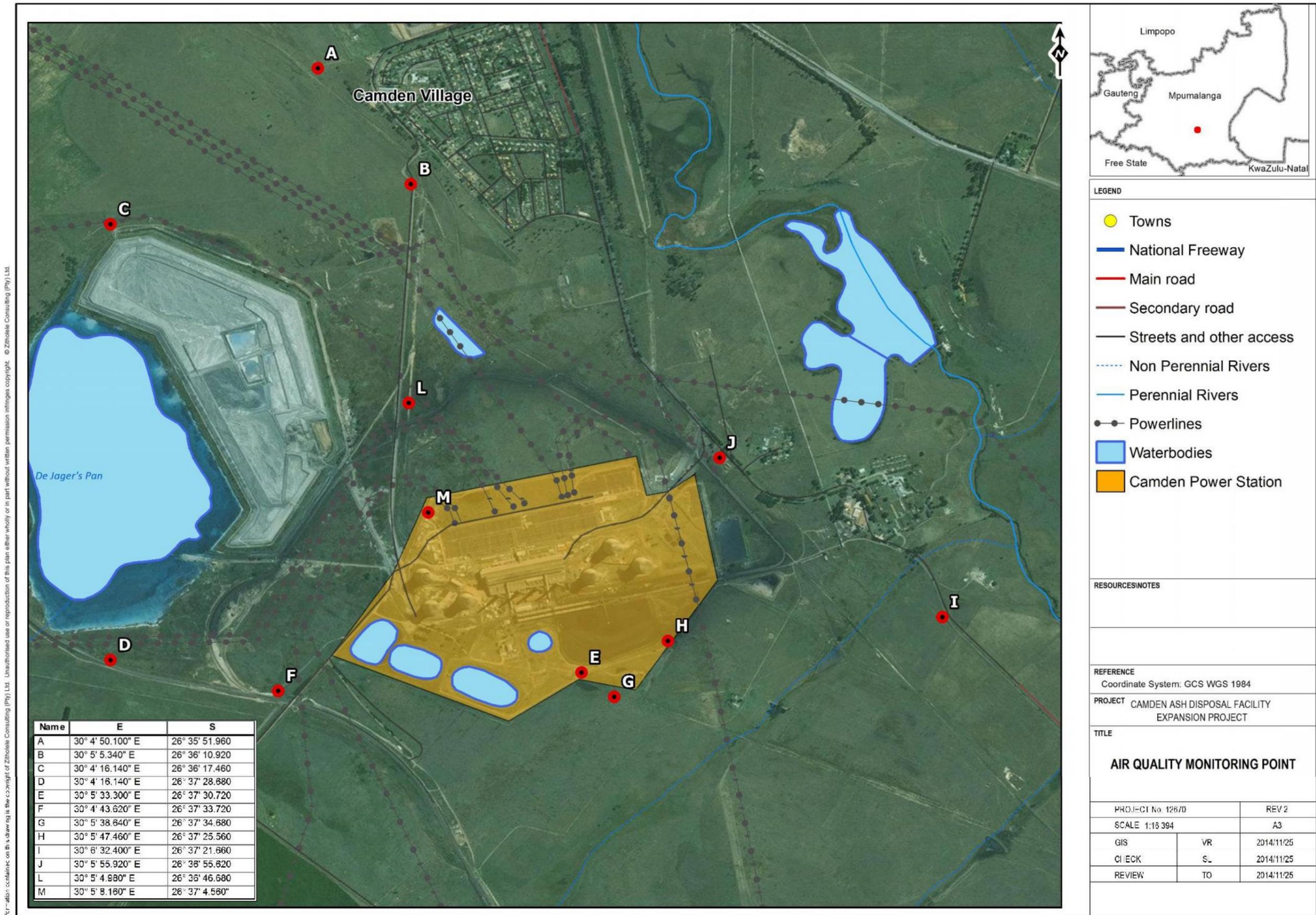
Camden Power Station established an Air Quality Monitoring site in 2013 in order to conduct monitoring on a monthly basis. The monitoring station is located to the East of the station (Site I) as per **Figure 4-4** below, and is equipped for continuous monitoring of ambient concentrations of:

- sulphur dioxide (SO<sub>2</sub>);
- nitrogen dioxide (NO<sub>2</sub>);
- ozone (O<sub>3</sub>); and
- fine particulate matter (FPM) of particulate size <10µm in diameter.

In addition to the above the instrument also measures meteorological parameters such as:

- wind velocity (WVL),
- wind direction (WDR),
- ambient temperature (TMP),
- humidity (HUM) and
- ambient pressure (PRS)

The rest of the sites in **Figure 4-4** portray existing dust fallout monitoring points that were established in 2011. Also refer to section 8.16 for mitigation measures.



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Figure 4-4 : Existing Dust Fallout monitoring points

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## **5. DESCRIPTION OF DEVELOPMENT ACTIVITIES**

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The development activities proposed for the extension of ash disposal facilities and associated infrastructure for the Camden Power Station during the construction, operational and decommissioning phases of the project are discussed below.

### **5.1 CONSTRUCTION PHASE**

The construction phase will include the following activities:

1. *Obtaining the Environmental Authorisation:* This will signal the commencement of the project construction phase. If a positive EA is obtained, the construction of the ash disposal facility will be undertaken over a period of 12 - 24 months.
2. *Installation of fences and access control:* The construction area will be secured with a fence installed at the outset of construction phase.
3. *Site preparation and clearance for contractor's camp:* Preparation of this area will include vegetation clearing, compaction, installation of bunded areas for hydro-carbon storage, establishment of temporary offices / storage facilities (such as containers or park homes), chemical toilets (portable / conservancy tanks), potable water storage, and fences and access control. This area will be rehabilitated as per the EMPr requirements post construction.
4. *Vegetation clearing to facilitate access and construction activities:* Vegetation must be cleared to facilitate access, construction and safe operation. Where protected indigenous vegetation needs to be removed it must be replanted or relocated after the relevant permits have been obtained.
5. *Establishing of access roads:* Once the contractor is established on site the access roads to the construction site will be established. Each road alignment will first be walked to ensure that site sensitivities are accounted for and avoided / planned for wherever encountered. Each road will then be cleared of vegetation, graded, and where necessary a nominal wearing course of gravel may be imported and/or the road may be compacted for added stability.
6. *Site services:* Apart from the access roads, no other services are envisaged for the proposed development. Portable chemical toilets will be used during the construction phase, and a reserve water tank of 2500 litres will supply potable water requirements at the construction camp as required.
7. *Pipeline construction:* A slurry and return water pipeline will be constructed. Pipeline construction will include a route walk down, identification of plinth positions, soil nominations at plinth positions, excavation for foundations, reinforcing and concreting of

foundations (installation of concrete plinths), assembling and installation of pipelines on plinths, connection to pumping source, and inspection of the pipeline prior to commissioning. Additional activities include excavation of the trenches, temporary stockpiling of soils, placement of a nominal gravel bedding inside trenches, testing of pipelines for leaks, replacement and profiling of stockpiled soils, and seeding and re-vegetation.

8. *Installation of clean and dirty water separation and containment infrastructure:* Construction will include surveying and pegging, walk down of the proposed alignment to identify site specific sensitivities and concerns, geotechnical investigations, vegetation clearance, channel excavation, material compacted to improve stability, and installation of concrete lining.
9. *Installation of a barrier system:* This involves the deposition and compaction of specific layers of material in a specific order on the proposed facility footprint.
10. *Construction of the starter wall for the first compartment:* Once all the protective measures are installed such as the clean and dirty water separation and containment infrastructure and the barrier system, then the starter wall for the first compartment can be constructed. Initial deposition needs to be contained using a starter earth wall for each compartment, built to a height that allows for less than 3.5m/year rise in the ash disposal facility.
11. *Remediation of construction activities:* It is envisaged that rehabilitation / remediation activities will include at a minimum profiling of the terrain, soil amelioration and improvement to promote establishment of a sustainable vegetation layer, seeding to ensure that a sustainable vegetation cover is established, irrigation, and alien invasive control.

## **5.2 OPERATIONAL PHASE**

The operational phase will include the following activities:

1. *Taking over the facility from the Contractor:* Eskom will take ownership of the ash disposal facility from the Contractor upon completion of construction phase.
2. *Access roads, fences, and access control:* Periodic maintenance will be undertaken and will include grading and profiling, importation of additional wearing course were required, debriding of storm water infrastructure such as cut-off / mitre drains, vegetation clearing (including firebreaks) and alien invasive control, repairing of fences, and litter collection and clean up.
3. *Pipelines:* Regular inspections of the pipelines will be undertaken to ensure the integrity of the pipelines is retained and to identify any leaks / damage that may have occurred.

General maintenance of the pipeline servitude such as vegetation clearing, alien invasive control, and repairs to fencing etc will also include maintenance of the flow meters and periodic flushing of the pipeline, replacement of pipe segments, and cleaning of spills / leaks that occur.

4. *Clean and dirty water separation and containment infrastructure:* Maintenance of the clean water separation channel will include clearing of the channel of debris, repairing of the channel as may be required, correction of any erosion identified, and control of alien invasive species. Further maintenance of the clean and dirty water systems will include regular monitoring.
5. *Barrier System Maintenance:* Once installed the barrier system will be inspected monthly in advance of deposition of waste. Any damage to the barrier system will be repaired immediately. Once the area has been covered with waste it is assumed that the integrity of the barrier system is intact, and will operate for the life of the facility.
6. *Ash disposal:* The ash slurry will be pumped from the power station to a central distribution point situated at a high point. From the distribution point the fly ash and the coarse ash are channelled through various open trenches and allowed to gravitate into the appropriate paddocks.
7. *Dewatering of the ash slurry:* Water on top of the ash dam will be decanted from the pool using penstocks. Up to two temporary penstock inlets per compartment in the initial phases will be required. A permanent penstock, central to each compartment will then be installed and operated for the life of the facility.

### 5.3 **DECOMMISSIONING PHASE**

The decommissioning phase will include the following activities:

1. *Consecutive capping of ash disposal facility:* Rehabilitation of the ash disposal facility will commence during the operational phase and continue consecutively with operation, ensuring that that the footprint for rehabilitation post operation is reduced. The methods for rehabilitation will be confirmed on site, and will be in compliance with the approved EMPr for the project.
2. *Profiling of the terrain:* This will ensure that it is free draining, and ties into the existing terrain without causing erosion;
3. *Soil amelioration and improvement:* This will be undertaken prior to placement to promote establishment of a sustainable vegetation layer;
4. *Placement of improved soil:* The improved soil will be placed in a 200 – 300mm thick layer capping over the ash body;

5. *Hydro-seeding*: Seeding of the area will be undertaken with an appropriate seed mix to ensure that a sustainable vegetation cover is established;
6. *Irrigation*: Water of the area, usually in the first two years, during dry spells to ensure vegetation cover is properly established is common; and
7. *Alien invasive control*: This is practiced to ensure that the area is maintained in a weed free condition.

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## 6. DESCRIPTION OF THE RECEIVING ENVIRONMENT

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The following aspects of the receiving environment have been considered in the EMPr.

1. *Climate:* The project area is characterised by warm, wet summers, and mild, dry winters, with equivalent evaporation depths exceeding precipitation. Regular dust storms can also be expected during periods of prolonged dry weather. Average annual rainfall for the Highveld decreases from 900mm in the east to 650mm in the west, with approximately 85% falling between October and April. In the vicinity of Camden Power Stations the estimated rainfall from showers and thunderstorms is about 726mm/year and the evaporation 1400mm/year.
2. *Geology:* The site falls within the Carboniferous to early Jurassic aged Karoo Basin, a geological feature that covers much of South Africa. Sediments in this part of Mpumalanga Province fall within the Permo-Triassic aged Northern facies of the Ecca Series, forming part of the Karoo sequence. Sediments of the Vryheid formation comprise the local geology. Shales, mudstones, siltstones and sandstones constitute the bulk of the formation, with interlayering of these sediments throughout. The coal seams have relatively high dirt content. Coal measures currently mined in the area form part of the Highveld Coal Field. The study area fall within the sediments of the Vryheid Formation consisting of grit, sandstone, shale and coal seams.
3. *Topography:* The study area ranges from 1 620 Metres above Mean Sea Level (mamsl) to 1 760mamsl. The highest parts of the study area are northwest of the site and the lowest parts are in the south-eastern portions of the study area, south of the Vaal River. The topography is undulating with shallow incised valleys where the main watercourses flow. Several pans are found throughout the area, especially on the sandstone geology.
4. *Soils:* The study site is underlain by siltstone, mudstone and sandstone that belong to the Vryheid Formation of the Ecca Group, Karoo Supergroup. Generally these geological structures will decompose in-situ, forming residual soils that may be silty and clayey, with the possibility of expansive soil being present. These soils are often blanketed by a considerable thickness of transported soils of colluvial origin that consist of silty and clayey fine sands.
5. *Agricultural potential:* The regional land capability is mostly Class II or IV soils with few limitations. This is evident in the large number of cultivated lands found in the region. In the areas where the soil is too shallow or too wet to cultivate, livestock are grazed. The study site is made up of several land capability classes, namely Class II, III, IV, V, VI and VII. The Class II - III soils are suitable for cultivation and can be used for a range of agricultural applications in the case of Class II. Class IV – V soils have features that reduce their potential for agricultural use, this can be flood hazards, erosion risk, texture or drainage.

6. *Surface water:* The main drainage features of the area are the Witpuntspruit which drains south-eastwards to the Vaal River, which is located some 6 km from Camden Power Station. Several unnamed tributaries are also found in the area. In addition to the streams, several wetlands and pans can also be found in the region. These support a number of faunal and floral species uniquely adapted to these aquatic ecosystems, and therefore all surface water bodies are earmarked as sensitive features. The De Jagers Pan is a natural depression/pan that is located adjacent to the existing ash disposal site. This pan is used as a return water dam as part of the approved water management system for the station. In addition to the pan there are small non-perennial drainage lines and wetlands present on site. It should however be noted that several of the so-called wetlands could also be classified as riparian zones as they follow the drainage path of the perennial and non-perennial streams. All the areas identified above perform critical ecosystem functions and also provide habitat for sensitive species.
7. *Terrestrial ecology:* The area under investigation is located within the Grassland Biome. Each biome comprises several bioregions which in turn has various vegetation types within the bioregion. The Grassland Biome is represented by Mesic Highveld Grassland and Inland Azonal Vegetation bioregions. Vegetation units located within the study site include Eastern Temperate Freshwater Wetlands and Eastern Highveld Grassland. Due to the recent efforts of organisations such as Ramsar, Eastern Temperate Freshwater Wetlands unit is now 4.6% conserved and rated as least threatened. This vegetation type on site includes De Jager's Pan. Eastern Highveld Grassland is considered endangered with a conservation target of 24%. Only a very small fraction is conserved in statutory reserves (Nooitgedacht dam and Jericho dam Nature Reserves) and in private reserves (Holkrans, Kransbank, Morgenstond). Approximately 44% is transformed primarily by cultivation, plantations, mines, urbanisation and by the building of dams. Cultivation may have had a more extensive impact, indicated by land-cover data. No serious alien invasions are reported, but *Acacia mearnsii* can become dominant in disturbed areas. No red data species were found. However species of importance noted on site include *Boophone disticha*.

A total of 568 arthropods are recorded for the study area. The large number is mainly due to the wide range of habitat available and the large area covered by the study site. A total of 3 reptilian species were recorded for the study site, whereas only one amphibian was recorded as occurring within the study area - *Rana angolense*. These species are not restricted in terms of habitat or distribution and none of the species recorded are classified as Red Data species. Mammal species diversity was low across the bulk of the study area, as very little natural habitat remains. Most of the mammals occur in small pockets of remaining natural vegetation, with a total of 6 species being recorded. Of these only the Aardvark is listed as vulnerable.

8. *Visual:* The proposed study site is found in a mostly rural landscape that has been infiltrated by mining and industrial development around the power station. The bulk of the study area is utilised for agriculture and coal mining with a varying topography.
9. *Wetland and Aquatics:* An assessment of the aquatic ecosystems surrounding the proposed ash dump facility as well as an impact assessment thereof was conducted in 2012 (Scientific Aquatic Services, 2012). The Humanspruit showed elevated salt levels as well as low pH values. The electrical conductivity (EC) measured 74.7mS/m and 100.7 mS/m, while the pH values measured were 5.55 and 6.30 respectively. These findings were concurrent with measurements taken in the field during the August 2014 site visit. Sampling of the biota in 2012 indicated that the Humanspruit is seriously impaired, with only four aquatic macro invertebrate taxa and no fish being captured during the study (Scientific Aquatic Services, 2012). A combined total of 24 aquatic macro invertebrate taxa were sampled, with six having a moderate requirement for unmodified water quality.

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## **7. ROLES AND RESPONSIBILITIES**

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### **7.1 CONTRACTUAL OBLIGATIONS**

In order to ensure that this EMPr and/or derivatives thereof are enforced and implemented, these documents must be given legal 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.

### **7.2 RESPONSIBILITIES AND DUTIES**

#### **7.2.1 The Developer**

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.

#### **7.2.2 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. The PM shall further:

- Oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications; and

- Liaise between, and with, the Contractor and ECO/EO/EM on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.

In addition the PM shall:

- 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, with the Environmental Manager;
- 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 and liaise with 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 possible 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.

### 7.2.3 Contractor

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 the 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 Safety, Health, Environment and Quality Officers 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;

***Reporting Structure:***

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

**7.2.4 Subcontractors**

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.

**7.2.5 Environmental Control Officer (ECO)**

The Developer will appoint an ECO to monitor and oversee implementation of the EMPr for the proposed construction works. The ECO 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 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 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 Authorities, but he/she will provide his/her reports to the Developer.

**7.3 TRAINING**

- The SHEQ officers 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 corridor;

- The PM and ECO shall ensure, on behalf of Eskom, that the employees (including construction workers, engineers, and long-term employees) are adequately trained on the stipulations of the EMPr; and
- All employees shall have an induction presentation on environmental awareness. The cost, venue and logistics shall be for Eskom's account.

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.

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

- All tendering Contractors / Sub-contractors will be made aware of the contents of this EMPr; and
- All appointed Contractors / Sub-contractors will be required to attend the EMPr training and induction as detailed in the section above.

#### **7.5 ENVIRONMENTAL AUTHORISATION**

The Environmental Manager shall ensure conveyance of the contents of this EMPr and the conditions of the Record of Decision (Environmental Authorisation/Waste Management Licence) from the Authorities and 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 Environmental Manager.

#### **7.6 ENVIRONMENTAL MANAGEMENT MEASURES**

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

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- Impact Assessment and mitigation measures documented in the Final EIR for the Camden Power Station ash disposal facility; and
  - The standard EMPr utilised by Eskom.

In addition to the abovementioned information sources, the EMPr may be updated to include the conditions documented in the environmental authorisation to be received upon approval of the EIA.

## 8. ENVIRONMENTAL SPECIFICATIONS

### 8.1 PRE-CONSTRUCTION PLANNING

**Table 8-1: Environmental Management Measures during pre-construction planning.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Ensure that all necessary legal obligations and contractual conditions have been met prior to commencement with construction;</li> <li>• To ensure that all role players and stakeholders are aware of the pending construction activities and have received timeous notice; and</li> <li>• To ensure that all construction staff are aware of their responsibilities and are informed about environmental sensitivities and the consequences of non-conformance.</li> </ul>
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No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Pre-construction appointments	ESKOM must appoint a suitably qualified Environmental Control Officer (hereafter referred to as ECO) who would act on behalf of the applicant.	Life of the Project	Once off	PM	PM	EM	Contractor
		The ECO must be appointed prior to the commencement of construction as per the Environmental Authorisation.	Life of the Project	Once off	PM	PM	EM	Contractor / RA
		The ECO shall remain employed until all rehabilitation measures are completed and the site is handed over to ESKOM.	Life of the Project	Daily	PM	PM	EM	C
		The Contractor shall designate or appoint suitably qualified Safety, Health, Environment and Quality Officers.	Life of the Project	Once off	C	C	C	EM PM ESKOM
		The following shall be maintained on site: <ul style="list-style-type: none"> <li>• Environmental authorisation and pertinent legislation,</li> </ul>	Life of the Project	Daily	PM	EM C	Separate (SHEQO) officers	EM PM ESKOM

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		<ul style="list-style-type: none"> <li>Relevant permits and licences,</li> <li>Method Statements,</li> <li>A daily site diary;</li> <li>A non-conformance register; and</li> <li>A public complaint registers.</li> </ul>						
2	Initiation	All relevant permits and permissions shall be obtained from the relevant authorities to undertake construction activities as necessary.	Prior to commencement	Once - off	PM	EM	EM ECO	RA
		A copy of the authorisation must be kept at the property where the activity will be undertaken and must be made available for inspection.	Throughout	Monthly Inspection	PM	EM C	Separate (SHEQO) officers	EM PM C
		No works shall commence on any activity until Method Statement has been approved in writing and works shall be carried out in accordance with these.	Prior to commencement	Once-off	PM ECO	EM	EM	C SHEQO
		The EMPr should be included in the tendering process.	Prior to commencement	Once - off	PM	PM	EM SHEQO	C ECO PM
		An environmental awareness training session for all of the Contractor's staff is required.	Prior to commencement	Once - off	PM	EM	ECO	C EM PM
		The course content for environmental awareness training shall be provided to the Contractor.	Prior to commencement	Once - off	PM	EM	ECO	SHEQO C PM
		The training session shall be delivered in the languages of the site staff as much as possible.	Prior to commencement	As required	PM	EM	ECO	C PM
No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Construction Phase</b>								
		Ensure proper supervision of employees at all times.	Life of the Project	Daily	PM C	EM SHEQO	EM SHEQO	PM C

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
								RA

**8.2 SITE ESTABLISHMENT AND DEMARCATION**

**Table 8-2: Environmental Management Measures during site establishment and demarcation.**

<b>Objectives</b>	<p><b>Project Area</b></p> <ul style="list-style-type: none"> <li>• Ensure proper demarcation of the project area prior to construction;</li> <li>• Ensure timely notice and negotiation with stakeholders in the event that access is required for construction purposes;</li> <li>• Ensure that all areas impacted during construction are rehabilitated to suitable levels; and</li> <li>• Ensure site is of sufficient size to accommodate the needs of all subcontractors that may work on the project.</li> </ul> <p><b>Existing services</b></p> <ul style="list-style-type: none"> <li>• The Contractor must be familiar with the position of existing services and infrastructure;</li> <li>• The Contractor shall ensure that existing services are not damaged or disrupted unless required by the contract;</li> <li>• 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.</li> </ul> <p><b>Controlled access</b></p> <ul style="list-style-type: none"> <li>• Properly installed access control to the site;</li> <li>• Minimise damage to fences; and</li> <li>• Limit access to ESKOM and Contractor personnel.</li> </ul>
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<b>Objectives</b>	<b>Servicing Vehicles</b>
	<ul style="list-style-type: none"> <li>• Prevention of pollution of the environment; and</li> <li>• Minimise chances of transgression of the acts controlling pollution.</li> </ul>
	<b>Traffic</b>
	<ul style="list-style-type: none"> <li>• Ensure the movement of trucks to and from the construction site must be well coordinated;</li> <li>• Ensure plant and heavy-duty machinery are not left unattended outside the contractor's site camp or designated area;</li> <li>• Ensure appropriate signage indicating construction works ahead is erected at strategic locations along the site access road(s), and</li> <li>• Ensure all temporary or permanent traffic calming measures, if required, is erected.</li> </ul>
	<b>Batching Plants</b>
	<ul style="list-style-type: none"> <li>• To ensure all agreements with Landowners are adhered to;</li> <li>• Prevention or minimisation of contamination and pollution; and</li> <li>• Successful rehabilitation of disturbed areas.</li> </ul>
	<b>Wet Areas</b>
<ul style="list-style-type: none"> <li>• Avoid impact to wet areas.</li> </ul>	
<b>Sanitation</b>	
<ul style="list-style-type: none"> <li>• Ensure that proper sanitation is received.</li> </ul>	
<b>Visual</b>	
<ul style="list-style-type: none"> <li>• Ensure that the construction site is kept neat and tidy at all times;</li> <li>• Contain and store general and construction related waste in the appropriate manner; and</li> <li>• Ensure the construction site or contractor's camp is cordoned off or shielded from view with appropriate material.</li> </ul>	

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Site identification/demarcation	The contractor's camp must be used for the storage of machinery and trucks as required.	Prior to site establishment	Daily	C	C	ECO	EM PM
		A Site Layout Plan illustrating the location and layout of the proposed construction camp must be approved by the PM.	Prior to site establishment	Once off	C	C	ECO	ECO EM PM
		A photographic record of the area earmarked for the site camp must be produced prior to site establishment. This will serve as the benchmark against which rehabilitation will be measured and shall be kept in the site environmental file.	Prior to site establishment	Once off	C	C	ECO	ECO EM PM

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Prior to construction commencing, the site shall be inspected to identify any sensitive environments.	Prior to site establishment	Once off	PM EM ECO	EM ECO	ECO	C
		Where necessary, No-Go areas shall be demarcated and enforced.	Prior to site establishment	Once off	PM EM ECO	EM ECO	ECO	C
2	Batching Plants	The siting, if necessary, of batching plants shall be done in conjunction with the ESKOM PM, the EM and the ECO.	Construction phase	As required	C	C SHEQO	SHEQO ECO	EM PM
3	Sanitation	The Contractor shall install and use mobile chemical toilets on site should other facilities not be available and must be at a ratio of 1 toilet per 15 workers. Toilets to be secured to the ground.	Throughout	As required	C	SHEQO	SHEQO ECO	EM PM
		Proper utilisation, maintenance and management of toilet, wash and waste facilities.	Throughout construction	Daily	C	SHEQO	SHEQO ECO	EM PM
		Prior to the establishment of the ablution facilities, an appropriate location must be approved.	Pre-Construction	Once-off	PM	EM ECO	SHEQO ECO	C PM
		The entrances to the ablution facilities shall be adequately screened from public view.	Pre-Construction	Once-off	C	SHEQO	SHEQO ECO	EM PM
4	Site Establishment – Contractors camp, wastewater management, Shower facilities	The contractor's camp shall be sited so as to cause the least amount of disturbance to adjacent landowners.	Pre-Construction	Once-off	C	SHEQO	SHEQO ECO	EM PM
		The contractor's camp shall be fenced and maintained for the duration of the construction activities.	Throughout Construction	Weekly	C	C SHEQO	SHEQO ECO	EM PM
		All amenities shall be installed at Camp sites before the main workforce move onto site.	Pre-construction	Monthly	C	C SHEQO	SHEQO	ECO EM PM
		The Contractor shall comply with the waste procedures of the Station.	Pre-Construction	Once-off	C	C SHEQO	SHEQO	ECO EM PM

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Where ESKOM facilities are available the Contractor shall make use of such facilities where it is viable.	Pre-Construction	Once-off	C	C SHEQO	SHEQO	ECO EM PM
		Should shower facilities be provided, the following controls must be imposed: <ul style="list-style-type: none"> <li>• Positioning of the shower, and specifically its discharge point, will be carried out to ensure that erosion and build up detergents does not occur;</li> <li>• All discharge from the shower and other washing facilities must pass through a suitable filter to reduce the load of detergents to the environment;</li> <li>• Filtered water discharge may thereafter be released to the environment, but mechanisms will be investigated to ensure that the water is evenly dispersed so as to lead to “greening up” and / or swampy conditions in one limited area;</li> <li>• Use of the shower facilities must be limited to staff or authorised persons only.</li> </ul>	Throughout Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
5	Eating Areas	The cooking area will be positioned such that no vegetation is in close proximity thereto.	Pre-Construction	Once-off	C	SHEQO	SHEQO ECO	EM PM
		Eating areas shall be designated and demarcated.	Pre-Construction	Once-off	C	SHEQO	SHEQO ECO	EM PM
		Sufficient bins shall be present in this area for all waste material.	Pre-Construction	Once-off	C	SHEQO	SHEQO ECO	EM PM
		Dish washing facilities shall be provided, but a process must be put in place to ensure that wastewater is disposed of appropriately (see Site Establishment - showers).	Pre-Construction	Once-off	C	SHEQO	SHEQO ECO	EM PM

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Construction Phase</b>								
1	Gate Installation as required	All gates shall be fitted with locks and be kept locked at all times where possible and applicable, however, where other appropriate access control measures are necessary, those should be followed.	Construction phase	Throughout	C	SHEQO	SHEQO ECO	EM PM
2	Project Area	Construction activities are limited to the area as demarcated by EM / ECO within the site identified for the construction of the Power Station.	Construction phase	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		All construction areas shall be cleared in accordance with the EA / EM Standard for Bush clearing.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Any extra space to be cleared outside the construction area shall be negotiated and approved by EM / ECO. All areas marked as no go areas inside the site shall be treated with the utmost care and responsibility.	Throughout Project	Monthly	PM	EM ECO	SHEQO ECO	C PM
3	Batching Plants	Batching plant area shall be operated in such a way as to prevent contaminated water to run off the site and polluting nearby streams or water bodies.	Throughout Construction	Weekly	C		SHEQO ECO	EM PM
4	Sanitation	Staff shall be sensitised to the fact that they should use these toilets at all times and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.	Throughout Construction	Daily	C	ECO	SHEQO ECO	EM PM
		Toilet paper is also a source of littering, and the Contractor shall be forced to clean up any litter.	Throughout Construction	Daily	C	ECO	SHEQO ECO	EM PM
		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.	Throughout Construction	Weekly	C	ECO	SHEQO ECO	EM PM

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Disposal of such waste is only acceptable to a licensed waste disposal facility.	Throughout Construction	Weekly	C	ECO	SHEQO ECO	EM PM
5	Emergency procedures	The site must be kept tidy and hygienic at all times with special reference to sanitation & water management.	Throughout Construction	Weekly	C	ECO	SHEQO ECO	EM PM
		Open uncontrolled fires will be forbidden at the site camp.	Throughout Construction	Weekly	C	ECO	SHEQO ECO	EM PM
		The Contractor shall be in possession of a complete emergency spill kits.	Throughout Construction	Weekly	C	ECO	SHEQO ECO	EM PM
6	Workshop	Workshop areas shall be monitored for oil and fuel spills and spills shall be cleaned and remediated to the satisfaction of the ECO.	Throughout Construction	Weekly	C	ECO	SHEQO ECO	EM PM
		Where possible, all maintenance of vehicles and equipment shall take place in the workshop area.	Throughout Construction	Weekly	C	ECO	SHEQO ECO	EM PM
7	Eating areas	The feeding of, or leaving of food for animals, is strictly prohibited.	Throughout Construction	Monthly	C	ECO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Batching Plants	All areas used as batching areas must be rehabilitated once construction is completed.	Rehabilitation	Monthly	C	C SHEQO	SHEQO ECO	EM PM
2.	Site Decommissioning	All areas where site infrastructure or camp sites are established must be rehabilitated to their original state.	Rehabilitation	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Prior to the removal of structures an assessment of the end land use will be undertaken to determine which structures will be removed or retained.	Rehabilitation	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Any specific requirements to prevent pollution during demolition of structures must be identified prior to rehabilitation.	Prior to rehabilitation	Once - off	C	C SHEQO	SHEQO ECO	EM PM
		Disposal requirements must be identified prior to the commencement of rehabilitation or structure removal.	Prior to rehabilitation	Once - off	C	C SHEQO	SHEQO ECO	EM PM

No	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Equipment, structures and building material that can be reused will be identified prior to the commencement of rehabilitation activities.	Prior to rehabilitation	Once - off	C	C SHEQO	SHEQO ECO	EM PM
		Scrap metal and equipment will be sold as scrap or disposed of at a suitably licensed facility.	Rehabilitation	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Vegetation that was removed for the establishment of site infrastructure shall be reinstated into the area.	Rehabilitation	Monthly	C	C SHEQO	SHEQO ECO	EM PM

### 8.2.1 Water Management (including Storm water, Water Sources, Wet Areas)

**Table 8-3: Environmental Management Measures for Water Management.**

<b>Objectives</b>	<b>Storm-water Management</b>
	<ul style="list-style-type: none"> <li>Effectively control storm water runoff to ensure that impacts to surface water resources are controlled, and erosion is not present on site.</li> </ul>
	<b>River Crossings</b>
	<ul style="list-style-type: none"> <li>Minimise damage to river and stream embankments;</li> <li>No access roads through river and stream banks;</li> <li>No visible erosion scars on embankments once construction is completed; and</li> <li>Minimise erosion of embankments and subsequent siltation of rivers, streams and dams.</li> </ul>
	<b>Wetlands</b>
	<ul style="list-style-type: none"> <li>No construction activities within designated wetland areas as identified in the EIA;</li> <li>Specified specialist recommendation and monitoring; and</li> <li>No pollution or effluent is to come in contact with wetland areas.</li> </ul>
	<b>Reduction of Existing Baseline Impacts</b>
	<ul style="list-style-type: none"> <li>Reduce polluted water recharge to the De Jagers Pan; and</li> <li>Remediate impacts to the De Jagers Pan.</li> </ul>

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Water Sources	Should water be required from sources other than ESKOM supply, a written agreement shall be reached between the Contractor and	Throughout Project	When necessary	PM	PM	EM ECO	C SHEQO

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		the stakeholder involved.						
		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.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Undertake continuous modelling (a daily time step model) of the dirty water management system in order to ascertain a more realistic capacity of the AWRD. Revised AWRD, and silt traps will be submitted and approved by DWA before construction.	Pre-Construct. Phase	Once Off	PM	EM ECO	ECO	C SHEQO
<b>Construction Phase</b>								
1	Water Sources	ECO shall regularly inspect the abstraction point and methods used.	Throughout Project	Weekly	PM	EM ECO	ECO	C SHEQO
2	Wetlands	No construction is to take place in wetland areas unless licensed.	Throughout Project	Weekly	C	C SHEQO	SHEQO ECO	EM PM
		Only existing roads through such areas may be used with the approval of ESKOM.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Berms should be created not closer than 10m from identified wetland areas, so as to ensure that no construction material and/or	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		waste flow into wetland systems.						
3	Dust control	Dust control measures must be put in place during construction activities.	During construction	Monthly	C	C	ECO	EM PM
4	Clean Storm water Management	Clean Storm water shall be channelled away from construction activities.	Prior to Construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		No storm water may be discharged into areas where construction is taking place.	Prior to Construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		Storm water flowing from the footprint of the proposed development may not be contaminated by any substances, whether the substance is solid, liquid or vapour or any combination thereof.	Throughout Construction	Weekly	C	C SHEQO	SHEQO ECO	EM PM
		During construction, the Contractor will protect areas susceptible to erosion to prevent surface water concentration into nearby roadways or river courses.	Prior to Construction	As required	C	C SHEQO	SHEQO ECO	EM PM
		Silt trap mechanisms will be installed on all temporary storm water channels and will be	Throughout Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		regularly checked and serviced as required.	n					
		All excavated and filled slopes and stockpiles must be of a stable angle and capable of accommodating normal expected flows.	Throughout Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Stabilisation of cleared areas to prevent and control erosion will be actively managed.	Throughout Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Traffic and movement over stabilised areas will be restricted. Any damage to stabilised areas will be repaired and maintained.	Throughout Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Where erosion and sedimentation occur, rectification will be carried out in accordance with details specified by the PM.	Throughout Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
5.	Monitoring ~ START	Specified monitoring as per section 2.13	Throughout Construction	C	C SHEQO	SHEQO ECO	EM PM	
<b>Operational Phase</b>								
1	Existing Facility – Closure	Closure of the existing facility should be planned well in advance in order to be able to rehabilitate during decommissioning of the	When required	Once-Off	PM	EM ECO	ECO	C SHEQO

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
	Planning	station.						
2	Existing Facility – Closure Rehab.	<p>Closure Planning for the existing facility must include provisions for the rehabilitation of the existing facility, including:</p> <ul style="list-style-type: none"> <li>• A sustainable topsoil layer;</li> <li>• A sustainable vegetation layer;</li> <li>• Containment of polluted water discharging from the existing facility;</li> <li>• Where water does not meet discharge standards suitable treatment of the water must be considered prior to release to the environment.</li> </ul>	When required	Once-Off	PM	EM ECO	ECO	C SHEQO
3	Existing Facility – De Jagers Pan	<p>On-going monitoring of the water level and water quality must be undertaken at the De Jagers Pan until such time that an acceptable water quality is achieved and proved to be sustainable.</p> <p>Where water quality is found to be below acceptable qualities set by the regional Resource Water Quality Objectives, or as in consultation with the DWS and DEA methods to improve water quality must be established.</p>	Throughout Project life cycle	Monthly	PM	EM ECO	ECO	C SHEQO
4	Monitoring and	The clean water diversion channel should be routinely monitored for acidity/alkalinity and	Throughout	Monthly/As specified	PM	EM ECO	ECO	C SHEQO

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
	maintenance	EC as an early warning for potential contamination by ash dust	Project	by permits				
		The discharge of clean water to the natural environment must not result in erosion or channelization of wetland areas	Throughout Project	As necessary	PM	EM ECO	ECO	C SHEQO
		Silt traps should be placed down-slope of where vegetation stripping will take place to minimise siltation in rivers and wetlands and need to be regularly maintained to ensure effective drainage.	Throughout Project	As necessary	PM	EM ECO	ECO	C SHEQO
		Water quality and biotic integrity should be routinely monitored in the Humanspruit and Witpuntspruit to assess and quantify the potential impact on the receiving environment	Throughout Project	As specified by permits	PM	EM ECO	ECO	C SHEQO
		Regular de-siltation of the pollution control dams, to keep adequate capacity.	Throughout Project	As specified by permits	PM	EM ECO	ECO	C SHEQO
		A monitoring program of the adjacent wetland and aquatic ecosystem is implemented.	Throughout Project	As specified by permits	PM	EM ECO	ECO	C SHEQO
<b>Rehabilitation Phase</b>								

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
1	Storm water Management	Any erosion channels will be backfilled and compacted, and the areas restored to a proper condition.	Throughout Construction	As necessary	C	C SHEQO	SHEQO ECO	EM PM

### 8.3 HAZARDOUS SUBSTANCE SPILLS

**Table 8-4: Environmental Management Measures for Hazardous Substance Spills**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>To ensure that spills occurring during the construction phase are suitably managed to reduce potential impacts on the environment.</li> </ul>

No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Hazardous Spills	Ensure that hazardous materials on site are identified and documented in a register.	Prior to site establishment	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		Appropriate training for the handling and use of such materials is to be provided by the Contractor as necessary.	Prior to site establishment	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		Products should be clearly labelled and symbolic safety/hazard warning signs should be provided.	Prior to site establishment	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		Fuel and chemical depot(s) shall be located at least 100 m from any water body/watercourse.	Prior to site establishment	Once-off	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Consult	Informed
		Ensure that suitable spill kits and absorption materials are purchased prior to commencement with construction, and stored suitably in places where there is a high risk of hazardous spills occurring.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Hazardous Spills	All contaminated soil shall be removed and be placed in containers and disposed of as per the Station waste policy.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		All potentially hazardous waste materials are to be managed as per the station's waste management procedures	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Areas for the storage of fuel and other flammable materials shall comply with standard fire safety regulations.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		The relevant Material Safety Data Sheets (MSDS) shall be available on site and shall be followed in the event of an emergency situation.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		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.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Consult	Informed
		All spills of hazardous substances must be reported to the ECO.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Hazardous Spills	Ensure that rehabilitated areas are free of visible spills and are suitably vegetated.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Where hazardous substances are removed from site for disposal thereof shall be according to the Station's waste procedures.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM

## 8.4 DELIVERY OF MATERIALS

**Table 8-5: Environmental Management Measures for the delivery of materials.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>To ensure that all sub-contractors responsible for delivering materials to site operate in an environmentally friendly manner whilst on site; and</li> <li>To ensure that the activities related to material deliveries do not create an unnecessary impact on the environment.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Heavy machinery	All drivers and operators must be appropriately licensed and have undergone environmental awareness training or induction.	Prior to construction	Once off	C	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Heavy machinery	No vehicles coming on sites must spill oil.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
		No construction equipment, construction vehicles or unauthorised personnel will be allowed onto areas that have been re-vegetated.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Heavy Machinery	All areas where heavy machinery has access must be rehabilitated.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
<b>Operational Phase</b>								

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
1	Heavy Machinery	No oil/ petrol spills / leaks may occur.	Throughout operational phase	Daily	C	C SHEQO	SHEQO ECO	EM PM

## 8.5 BUILDING, CIVILS AND STRUCTURAL STEEL WORK

**Table 8-6: Environmental Management Measures for building, civil's and Structural Steel Work**

<b>Objective</b>	<ul style="list-style-type: none"> <li>To ensure that all construction related activities including civils, building erection, and structural work is undertaken in such a manner that it reduces unnecessary impact to the environment.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
None								
<b>Construction Phase</b>								
1	Excavations	Manage oil leaks from heavy vehicles.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
		PPE must be used by all workers using hand tools during the excavations of foundations.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
		Perimeter of all open excavations to be securely fenced.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
		Spoil must be evenly spread.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
2	Mixing concrete	Workers mixing concrete must wear PPE.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
		Cement bags must not become litter after use (see Waste Management). Cement bags must be disposed off at hazardous site	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		All concrete spills should be reinstated into foundations as backfill.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
3	Place steelwork on foundations	All steel off-cuts must be collected for recycling purposes.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
		During steel cutting and grinding, all old discs must be managed properly and must not become litter. All personnel to have the correct PPE during any of these actions.	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
4	Connect earthing to steelwork	During welding and brazing, all old welding rods must be managed and must not become litter. All personnel to have the correct PPE during any of these actions	Construction	Daily	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	De-establish contractors yard / store	All waste, garbage, surplus materials and oils spills to be cleared and site must be rehabilitated.	During Rehabilitation	Once - off	C	C SHEQO	SHEQO ECO	EM PM
2	Final inspection	During site inspection the site is to be cleared and rehabilitated appropriately to the approval of the ECO.	During Rehabilitation	Once - off	C	C SHEQO	SHEQO ECO	EM PM

## 8.6 ACCESS ROADS

**Table 8-7: Environmental Management Measures for Access Roads.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Minimise damage to existing access roads;</li> <li>• Minimise damage to environment due to construction and rehabilitation of new access roads; and</li> <li>• Minimise loss of topsoil and enhancement of erosion.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Access Roads	If required, planning of access routes must be done in conjunction between the Contractor and ESKOM.	Once off	As necessary	PM	PM C	ECO	EM
		The condition of existing access / private roads to be used shall be documented with photographs.	Prior to construction	Once-off	C ECO	C SHEQO	SHEQO ECO	EM PM
		The Contractor shall properly mark all access roads, with markers shall show the direction of travel.	Prior to construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		Roads not to be used shall be marked with a <b>"NO ENTRY"</b> sign (refer also TRMSCAAC1 REV 3).	Prior to construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		Where required, speed limits shall be indicated and speed control measures	Prior to construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		applied on the roads.	n					
		Water diversion berms shall be installed from the start of the contract.	Prior to construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting at the base of the berm.	Prior to construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Permanently wet areas are shown on the profiles. No vehicular traffic shall be allowed in such areas unless authorised.	Construction		C	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Access Roads	All speed limits shall be strictly adhered to at all times.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		Where new access roads are constructed, this must be done in accordance with TRMSCAAC1 REV 3 Section 4.4.	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Berms shall be maintained at all times.	Construction	Monthly inspection	C	C SHEQO	SHEQO ECO	EM PM
		The installation of concrete pipes and drifts, to facilitate access, shall be at the discretion	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		of the Environmental Control Officer on site.						
		Any dangerous crossings shall be marked as such and where necessary, speed limits shall be enforced.	Construction	Monthly inspection	C	C SHEQO	SHEQO ECO	EM PM
		All existing private access roads used for construction purposes, shall be maintained at all times.	Construction	Monthly inspection	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Access Roads	Berms must be repaired at the end of the contract.	End of contract	Once off	C	C SHEQO	SHEQO ECO	EM PM
		Upon completion of the project all roads shall be repaired to a satisfactory state.	End of contract	Once off	C	C SHEQO	SHEQO ECO	EM PM
<b>Operational Phase</b>								
None.								

## 8.7 WASTE MANAGEMENT

**Table 8-8: Environmental Management Measures for waste management.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• To keep the construction site neat and clean.</li> <li>• Disposal of rubble and refuse in an appropriate manner</li> <li>• Minimise litigation</li> <li>• Minimise neighbour complaints</li> <li>• No visible concrete spillage on the site.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Refuse and Rubble Removal	A method statement is required from the Contractor that includes the layout of the camp, management of ablution facilities and waste management in line with Eskom's waste management procedures.	Prior to construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		The Contractor shall provide a waste management system that will comply with legal requirements and be acceptable to ESKOM.	Prior to construction	Weekly inspection	C	C SHEQO	SHEQO ECO	EM PM
		A certificate of disposal shall be obtained by the Contractor and kept on site.	Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		In the case where a registered waste site is not available close to the construction site, the Contractor will be responsible to provide	Prior to construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		a method statement with regard to waste management, or comply with Eskom's waste management procedures.	n					
		Under no circumstances may solid waste be burned on site unless a suitable incinerator is available.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		The disposal of waste shall be in accordance with Eskom's waste management procedures.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Refuse and Rubble Removal	The Contractor shall dispose of all waste material as per Eskom's waste management procedures.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		No material shall be left on site that may harm man or animals.	Throughout Project	Weekly inspection	C	C SHEQO	SHEQO ECO	EM PM
		Broken, damaged and unused material shall be picked up and removed from site.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		Surplus concrete may not be dumped indiscriminately on site, but can be reinstated into foundations. Any spilled concrete shall be cleaned up immediately.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Under no circumstances may solid waste be burned or buried on site unless a suitable incinerator is available.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		The washing of concrete trucks on site is prohibited. Any spilled concrete shall be cleaned up immediately.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		The Contractor must provide Authorities with proof of confirmation of service provision from waste service providers for the removal of wastes, when requested.	Throughout Project		C	C SHEQO	SHEQO ECO	EM PM
		A general site-wide litter clean up will occur at least once a week.	Throughout Project	Weekly	C	C SHEQO	SHEQO ECO	EM PM
		Waste will be collected from site by a licensed contractor and removed to an appropriate waste disposal facility.	Throughout Project	Weekly	C	C SHEQO	SHEQO ECO	EM PM
		Wherever possible, materials will be recycled via a "Greens waste site". 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.	Throughout Project	Weekly	C	C SHEQO	SHEQO ECO	EM PM
		Littering by the employees of the Contractor	Throughout	Daily	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		shall not be allowed.	Project					
<b>Rehabilitation Phase</b>								
1	Refuse and Rubble	Same as construction phase.						
<b>Operational Phase</b>								
1	Refuse and Rubble	Same as construction phase.						

## 8.8 FIRE PREVENTION

**Table 8-9: Environmental Management Measures for Fire Prevention.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• No veld fires started by the Contractor's work force.</li> <li>• No claims from Landowners for damages due to veld fires.</li> <li>• No litigation.</li> </ul>							
No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Fire Prevention	The Contractor shall ensure proper fire-fighting equipment is available on site.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		The Contractor will document a fire reduction/ management plan. The plan will identify sources of fire hazard, and appropriate management measures to reduce the identified risk. The relevant	Prior to commencement of construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM

		authority will be notified of such potential fire hazards.	n					
<b>Construction Phase</b>								
1	Fire Prevention	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.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		In terms of the Atmospheric Pollution Prevention (APPA), burning is not permitted for waste disposal.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		Suitable precautions will be taken when working with welding or grinding equipment.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		All fire control mechanisms (fire fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		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.	Throughout Project	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		The Contractor will advise the relevant authority of a fire outside of a demarcated area as soon as it starts and will not wait until he can no longer control it.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM

Rehabilitation Phase		
1	Fire Prevention	None.
Operational Phase		
1	Fire Prevention	As per Eskom procedures.

## 8.9 DESIGNATED STORAGE AREAS

**Table 8-10: Environmental Management Measures for Designated Storage Areas.**

<b>Objective</b>	<ul style="list-style-type: none"> <li>To ensure that cognisance is taken of proper storage of dangerous goods and hazardous materials so as to avoid accidents, spillage, and impacts to the environment.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed	
<b>Pre-Construction Phase</b>									
1	Workshop, equipment maintenance and storage	All hazardous substances shall be stored in suitable containers and storage areas shall be bunded.	During construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM	
		A register of hazardous substances shall be kept and be available for inspection at all times.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM	
<b>Construction Phase</b>									
1	Workshop, equipment maintenance and storage	Servicing of vehicles must be done in line with Power Station's procedures.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM	
		Emergency repairs may not be allowed on site and a drip tray shall be used to prevent oil spills.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM	
		In the event of a breakdown, any oil spills shall be cleaned up immediately and appropriate environmental investigations undertaken and recorded.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM	
		The following shall apply:							
		<ul style="list-style-type: none"> <li>All contaminated soil shall be removed and be placed in containers.</li> <li>Smaller spills can be treated on site;</li> <li>A specialist Contractor shall be used for</li> </ul>	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM	

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		<p>the bio-remediation of contaminated soil;</p> <ul style="list-style-type: none"> <li>The area around the fuel storage drum at the Contractor's campsite shall also be rehabilitated upon completion of the contract; and</li> <li>All oil spills must be reported to ECO immediately.</li> </ul>						
		Under no circumstances shall such waste be buried on site indiscriminately.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		No washing of plant may occur on the site unless part of the Eskom waste Procedures.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		The contractor will ensure that if emergency plant maintenance occurs on site, that there is no contamination of soil or vegetation (e.g. use of drip trays).	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Drip trays will be provided for the stationary plant and for the "parked" plant.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.	Throughout Project	Daily	C	C SHEQO	SHEQO ECO	EM PM
		The relevant contractor must ensure that facilities for the collection of hydraulic and other vehicle oils are provided within the	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		hard park area.						
2	Materials use, handling and storage	The Contractor will ensure that delivery drivers are informed of all procedures and restrictions required by this document.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Materials will be appropriately secured to ensure safe passage between destinations.	Throughout Project	Throughout	C	C SHEQO	SHEQO ECO	EM PM
		The Contractor will be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		All material lay-down areas and stockpiles will be subject to the Site Manager's approval.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Imported fill / soil / sand materials will be free of weeds, litter and contaminants.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Storage areas will be roofed in an impervious material, with a suitable overhang or side cladding. Rainwater run-off will be channelled away from the storage area as required.	Throughout Project	Once-off	C	C SHEQO	SHEQO ECO	EM PM
		Hazardous and flammable substances must be stored and used in compliance with	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		applicable regulations and safety instructions.	Project					
		Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Servicing of Vehicles	None.						
<b>Operational Phase</b>								
1	Servicing of Vehicles	None.						

## 8.10 ASH DISPOSAL FACILITY

**Table 8-11: Environmental Management Measures for Ash Disposal Facility.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Minimise damage to topsoil and environment.</li> <li>• Successful rehabilitation of all damaged areas</li> <li>• Prevention of erosion and no visible erosion scars three months after completion of the contract</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
		None						
<b>Construction Phase</b>								
1	Ash Disposal Facility Positioning	Disturbance of topsoil site with severe slopes shall be minimised.	Throughout Project	As required	C	C SHEQO	SHEQO ECO	EM PM
		During backfilling operations, the Contractor shall ensure that spoils are not placed upon areas earmarked for topsoil storage.	Throughout Project	As required	C	C SHEQO	SHEQO ECO	EM PM
		In accordance with the Conservation of Agricultural Resources Act, No 43 of 1983, slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced.	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Contour banks shall be spaced according to the slope on tower sites. The type of soil shall also be taken into consideration.	Throughout Project	Monthly	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Ash Disposal Facility Positioning	Re-seeding shall be done on disturbed areas as directed by the Environmental Control Officer.	Post construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		Other methods of rehabilitation of the sites may also be used at the discretion of the	When	When	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Environmental Control Officer, e.g. stone pitching, logging, etc.	necessary	necessary				
		<p>A mixture of seed can be used provided the mixture is carefully selected to ensure the following:</p> <ul style="list-style-type: none"> <li>• Annual and perennial plants are chosen;</li> <li>• Pioneer species are included;</li> <li>• All the plants shall not be edible;</li> <li>• Species chosen will grow in the area without many problems;</li> <li>• Root systems must have a binding effect on the soil; and</li> <li>• The final product should not cause an ecological imbalance in the area.</li> </ul>	Throughout Project	When necessary	C	C SHEQO	SHEQO ECO	EM PM
<b>Operational Phase</b>								
1	Ash Disposal Facility	None.						

## 8.11 CLAIMS FROM DAMAGES

**Table 8-12: Environmental Management Measures for Claims from Damages.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>Minimise complaints from Landowners</li> <li>Prevent litigation due to outstanding claims by ensuring that claims are settled within one (1) month.</li> <li>Successful completion of the contract and all Landowners signing release forms within 6 months of completion of the project.</li> </ul>

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Claims from Damages	None.						
<b>Construction Phase</b>								
1	Claims from Damages	All damage to ESKOM property shall be recorded and reinstated immediately.	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		The Environmental Control Officer should also keep a photographic record of such damage.	When necessary	When necessary	ECO	ECO	SHEQO ECO	EM PM C
		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.	Construction	When necessary	ECO	ECO	SHEQO ECO	EM PM C
		All claims for damage should be directed to the Environmental Control Officer for	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		appraisal.						
		The Contractor shall be held liable for all unnecessary damage to ESKOM property.	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		A register shall be kept of all complaints from Landowners.	Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		All claims shall be handled immediately to ensure timeous rectification / payment.	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Claims from Damages	None.						
<b>Operational Phase</b>								
1	Claims from Damages	None.						

## 8.12 EROSION, DONGA AND RIVER CROSSINGS

**Table 8-13: Environmental Management Measures for Erosion, Donga and River Crossings.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Minimise erosion damage. There should be no visible damage caused by construction activities.</li> <li>• Minimise impeding the natural flow of water</li> <li>• Minimise initiation of erosion through donga embankments</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Erosion and donga Crossings	Crossing of dongas and eroded areas of associated infrastructure shall be thoroughly planned.	Prior to construction	Once-off	PM	PM EM	ECO EM	C SHEQO
		All structures constructed for access purposes shall be properly designed and drawings of such structures shall be available for record purposes.	Prior to construction	Once-off	C	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Erosion and Donga Crossings	Water diversion berms shall be installed at donga crossings to ensure runoff water on the servitude does not run into dongas and cause an erosion hazard.	Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		Suitable erosion containment structures shall be constructed at donga crossings where required and viable.	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		No unplanned / improperly planned cutting of donga embankments is allowed as this leads to erosion and degradation of the environment.	Construction	Throughout	C	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
1	Erosion and Donga Crossings	None.						
<b>Operational Phase</b>								
1	Erosion and Donga Crossings	None.						

### 8.13 FLORA MANAGEMENT (INCLUDING VEGETATION CLEARING, GENERAL, AND HERBICIDES)

**Table 8-14: Environmental Management Measures for Flora Management.**

<b>Objective</b>	<ul style="list-style-type: none"> <li>• Minimise damage to vegetation by only clearing 8m vegetation along the centre of the servitude for access purposes.</li> <li>• Keep site as naturally looking as possible.</li> <li>• No vegetation interfering with structures and statutory safety requirements upon completion of the contract.</li> <li>• Minimise possibility of erosion due to removal of vegetation by not de-stumping vegetation on river and stream embankments.</li> <li>• Eradication of alien invader and densifier species that cause a fire hazard.</li> <li>• No visible herbicide damage to the vegetation on site one year after completion of the contract due to incorrect herbicide use.</li> <li>• No litigation due to unauthorised removal of vegetation.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Vegetation Clearing	Vegetation clearing shall be done in accordance with ESKASABG3 REV 0 (Standard for bush clearance and	Prior to construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
		maintenance within overhead power line servitudes) and the Vegetation Management Guideline, or any approved Eskom procedure.						
		The Contractor will remove plants containing any diseases and /or pests from the site.	Prior to construction	Weekly	C	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Vegetation Clearing	The removal of indigenous/protected and or medicinal plant material, requiring permitting, from the site or surrounding and adjacent land will not be allowed, without necessary permitting.	Construction	Througho ut	C	C SHEQO	SHEQO ECO	EM PM
		No scalping shall be allowed on any part of the servitude road unless absolutely necessary.	Construction	Througho ut	C	C SHEQO	SHEQO ECO	EM PM
		All trees and vegetation cleared from the site shall be cut into manageable lengths and removed from the site.	Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		No vegetation shall be pushed into heaps or left lying all over the site.	Construction	Througho ut	C	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
		All protected species not to be removed must be clearly marked and such areas fenced off if required.	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		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 (Contact Dr. Eugene van Rensburg—Vegetation Management).	Construction	When necessary	C	C SHEQO	SHEQO ECO	EM PM
		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.	Construction	Monthly	C	C SHEQO	SHEQO ECO	EM PM
		All alien vegetation on site and densifiers creating a fire hazard shall be cleared and treated with herbicides.	Construction	Weekly	C	C SHEQO	SHEQO ECO	EM PM
4	Search and Rescue of Endangered Plant	Should Protected or Endangered Plant Species be found on site they will be demarcated and cordoned off. Permits should be in place before removal. Where feasible, appropriate genetic material such	Construction	When necessary	PM	EM ECO	ECO SHEQO	C

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
	Species	as seeds or propagules of the plant species shall be collected and stored at a licensed facility.						
		In situ conservation of Protected and Endangered Plant Species is preferable to ex situ conservation. Thus, should the plant species not “interfere” with the construction of a structure, the area surrounding the plant species shall be declared a “no-go” area as outlined in the Ecological Management Plan;	Construction	Through out	PM	EM ECO	ECO SHEQO	C
		The area surrounding the plant species shall be declared a “No-go” area and a buffer zone will be applied as outlined in the Ecological Management Plan;	Construction	Through out	PM	EM ECO	ECO SHEQO	C
5	Alien Plant Control and Monitoring	The Contractor will be responsible for controlling all alien invasive species.	Construction	Through out	PM	C SHEQO	SHEQO ECO	EM PM
		Alien invasive plant material will be preferentially removed in entirety through mechanical means (e.g. chainsaw, bulldozer, hand-pulling of smaller specimens);	Construction	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Immediately after being cut, an herbicide solution must be applied to the exotic trees to ensure no further growth. The person applying the herbicide must have read and understood the instructions. Care must be taken that there is no spillage of solution in	After being cut – immediately	Through out	PM	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
		the wetland and that the correct protective equipment must be used;						
		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;	Construction	Monthly	PM	C SHEQO	SHEQO ECO	EM PM
		Herbicides used must be approved by authorities and as per the supplier's specifications;	When necessary	Once-off	PM	C SHEQO	SHEQO ECO	EM PM
		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;	Construction	Throughout	PM	C SHEQO	SHEQO ECO	EM PM
		If during the establishment period any noxious or excessive weed growth occurs, such vegetation will be removed; and	Construction	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		It is the developer's responsibility to implement a monitoring programme that will be instituted to ensure that re-growth of alien invasive plants species does not occur, or that such re-growth is controlled.	Construction	Monthly	PM	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Traffic on rehabilitated	Special attention must be given to the potential for soil erosion and the associated environmental degradation. It is also	Post construction	Monthly	PM	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
	areas.	essential to undertake alien vegetation control and management.						
		No construction equipment, construction vehicles or unauthorised personnel will be allowed onto areas that have been re-vegetated	Construction	Through out	PM	C SHEQO	SHEQO ECO	EM PM
		Only persons / equipment required for maintenance thereof will be allowed to operate on such areas.	Construction	Through out	PM	C SHEQO	SHEQO ECO	EM PM
2	Management of Plant Material	All plant material used on site will be obtained from an approved nursery;	Post construction	Through out	PM	C SHEQO	SHEQO ECO	EM PM
		The Contractor will remove plants containing any diseases and/or pests from the site;	Construction	Through out	PM	C SHEQO	SHEQO ECO	EM PM
		Propagation of suitable indigenous vegetation that is quick to establish such as grasses, should be encouraged in areas where vegetation has been removed	Construction	Through out	PM	C SHEQO	SHEQO ECO	EM PM
		On planting, there will be sufficient topsoil around each plant to prevent desiccation of the root system. Where plants are stored on site prior to planting they will be maintained to ensure that the root systems remain moist; and	Construction	Through out	PM	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
		Each plant brought onto site will be handled and packed in an approved manner for that species or variety, and that all necessary precautions are taken to ensure that the plants arrive on the site in a proper condition for successful growth (e.g. good plant specimens chosen, disease and/or pest free, potting material weed free, plants covered during transportation, containers in good condition);	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
3	Reseeding of Disturbed Areas	All reseeded activities will be undertaken at the end of the dry season (middle to end September) to ensure optimal conditions for germination and rapid vegetation establishment;	Construction	Wet Season	PM	C SHEQO	SHEQO ECO	EM PM
		The seed mix will be approved by the ECO prior to seeding;	Construction	Wet Season once-off	PM	C SHEQO	SHEQO ECO	EM PM
		Seeds should be covered by use of an agricultural roller or similar mechanism;	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
		Inspect rehabilitated area at three monthly intervals during the first and second growing season to determine the efficacy of rehabilitation measures; and	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
		Take appropriate remedial action where vegetation establishment has not been successful or erosion is evident within the first two growing seasons.	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
4	Alien Plant Control and Monitoring	Alien plant control will be conducted as described in Section 5.14, for a period of two years after the rehabilitation phase is completed.	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
5	Management of Soil and Land Capability	All excess building material and rubble must be collected and disposed of in line with station's waste management procedures.	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
		Soils must be ripped to refusal or a minimum of 300mm prior to seeding.	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
		All areas must be profiled to tie in with adjacent terrain. Where necessary suitable soil must be imported obtain a suitable profile.	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
		Suitable erosion control measures must be installed in areas where erosion may occur;	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
		Apply a suitable mixture of N:P:K fertiliser prior to seeding;	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM
		Harrow the disturbed areas after spreading the topsoil and fertilizer uniformly;	Construction	Througho ut	PM	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Consult	Consult	Informed
		Rehabilitated and profiled areas must be inspected for erosion every three months for the first two years. Additional measures must be implemented to remediate erosion where it is observed.	Construction	Throughout	PM	C SHEQO	SHEQO ECO	EM PM
<b>Operational Phase</b>								
1	Vegetation Clearing	None						

#### 8.14 FAUNA MANAGEMENT

**Table 8-15: Environmental Management Measures for Fauna Management.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Minimise disruption of farming activities (No stock losses where construction is underway);</li> <li>• Minimise disturbance of animals;</li> <li>• Minimise interruption of breeding patterns of birds; and</li> <li>• No litigation concerning stock losses and animal deaths.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Fencing	Ensure that suitable fencing is erected prior to the commencement of construction to ensure that live stock does not wonder into dangerous areas.	Throughout the project	Weekly inspections.	PM	C SHEQO	SHEQO ECO	EM PM

Construction Phase								
1	Construction	Should any new sites or nests be found, during the construction process, that was not known or have been noted before, each site shall be assessed for merit and the necessary precautions be taken to ensure the least disturbance.	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
Rehabilitation Phase								
1	Construction	Same as construction phase.						
Operational Phase								
1	Construction	Same as construction phase.						

**8.15 INTERACTION WITH ADJACENT LANDOWNERS**

**Table 8-16: Environmental Management Measures for Interaction with Adjacent Land Owners**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Maintain good relations with Landowners;</li> <li>• No delays in the project due to Landowner interference; and</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
		No verbal agreements shall be made. All agreements shall be recorded properly and all parties shall co-sign the documentation. It is proposed that a photographic record of access roads be kept.	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Interaction with Land Owners	The construction process will use the services of the Power Station Environmental Monitoring / Management Committee (EMC) for communication with the land owners.	Throughout the project	Monthly	PM	PM	EM ECO	C SHEQO
<b>Rehabilitation Phase</b>								
1	Interaction with Land Owners	Same as for construction phase above.						
<b>Operational Phase</b>								
1	Interaction with Land Owners	None						

## 8.16 AIR QUALITY MANAGEMENT

**Table 8-17: Environmental Management Measures for Interaction with Adjacent Land Owners**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Reduce dust during arising from site;</li> <li>• Manage dust; and</li> <li>• Monitor air quality.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Design and Planning	Ensure that “no-go” areas are staked and marked clearly prior to construction commencing.	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Establish a dust monitoring programme, in the event that mitigation measures are not successful further measures are to be investigated and implemented.	Throughout the project	Permanent	PM	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Land clearing activities	Water sprays at cleared area	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Moisten topsoil to reduce the potential for dust generation when tipped onto stockpiles;	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Ensure travel distance between clearing area and topsoil piles is at a minimum;	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Ensure that vegetation clearing is limited to	Throughout	When	PM	C SHEQO	SHEQO ECO	EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		only the areas where construction will take place;	the project	necessary				
		Prevent construction vehicles from riding all over the site, and ensure that they stick to predetermined routes and low speeds;	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
2	Wind erosion from exposed areas	Ensure exposed areas remain moist through regular water spraying;	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Dust fallout bucket to be placed to the west and southeast of the ash disposal facilities with monthly dust fallout rates not exceeding 1200 mg/m <sup>2</sup> /day <sup>3</sup> ;	Throughout the project	Monthly	PM	C SHEQO	SHEQO ECO	EM PM
		Sequence the construction methodology in such a way so as to reduce the area of exposed soil to its minimum extent practically possible;	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
3	Dust Suppression	Use chemical dust suppression (such as dust-a-side) on areas to be frequently used, if possible;	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Install wind breaks (e.g. growth of trees or shrubs serving to break the force of wind) to ensure that low level winds are reduced and particle mobilisation is reduced;	Throughout the project	Ongoing	PM	C SHEQO	SHEQO ECO	EM PM

<sup>3</sup> Draft dust fallout regulation of 1200 mg/m<sup>2</sup>/day for industrial sites.

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Regularly undertake dust suppression using to ensure that dust mobilisation is prevented.	Throughout the project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
<b>Operational Phase</b>								
1	Wind erosion from exposed areas	Ensure water sprays at and around the ash disposal facility	Throughout the project	When necessary	PM	SHEQO	SHEQO ECO	EM
		Cover ash disposal facility with topsoil as operations commence and ensure vegetation cover on ash disposal facility	Throughout the project	When necessary	PM	SHEQO	SHEQO ECO	EM
		Ensure vegetation cover on the ash disposal facility	Throughout the project	When necessary	PM	SHEQO	SHEQO ECO	EM
2	Monitoring	Dust fallout bucket to be placed to the west and southeast of the ash disposal facilities with monthly dust fallout rates not exceeding 1200 mg/m <sup>2</sup> /day	Throughout the project	Monthly	PM	SHEQO	SHEQO ECO	EM
		It is also recommended that single dust fallout buckets be installed downwind of the ash disposal facility in order to monitor the impacts from this source.	Throughout the project	Monthly	PM	SHEQO	SHEQO ECO	EM
<b>Closure / Rehabilitation Phase</b>								
1	Facility Closure/	Cover ash disposal facility with previously collected topsoil.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
	Rehab	Apply water sprays to ensure the material remain moist.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Ensure vegetation cover on the ash disposal facility.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Ensure that the mitigation measures for soil and land capability as well as terrestrial ecology are implemented.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Ensure that regular watering is undertaken of exposed soils and re-vegetated areas to assist in the rapid establishment of a sustainable vegetation cover.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Ensure that vegetation clearing is limited to only the areas where construction will take place.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Ensure that "no-go" areas are fenced to ensure that closure activities do not impact unnecessarily on the wider area.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Use chemical dust suppression (such as dust-a-side) on areas to be frequently driven.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Ensure that the installed dust suppression is maintain end and operational on all uncapped areas of the facility.	Throughout closure	Permanent	PM	SHEQO	SHEQO ECO	EM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
		Dust suppression on the ash body is to be undertaken in such a manner as to ensure that air quality impacts are within acceptable Air Quality Standards (especially for dust, PM2.5, and PM10 particulates).	Throughout and after closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Maintain all installed wind breaks to ensure that low level winds are reduced and particle mobilisation is reduced.	Throughout and after closure	Permanent	PM	SHEQO	SHEQO ECO	EM
		Maintain ongoing dust monitoring programme to test for compliance with the South African Air Quality Standards	Throughout and after closure	Monthly	PM	SHEQO	SHEQO ECO	EM
		Regularly undertake dust suppression using uncontaminated water to ensure that dust mobilisation is prevented.	Throughout closure	When necessary	PM	SHEQO	SHEQO ECO	EM

## 8.17 NOISE / WORKING HOURS

**Table 8-18: Environmental Management Measures for Noise Management.**

<b>Objective</b>	To ensure that noise is managed in such a manner that no complaints are received.
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
None								
<b>Construction Phase</b>								
1	Noise	Working hours are to be limited to weekdays between 7h00 to 17h00.	Throughout the project	Throughout	PM	C SHEQO	SHEQO ECO	EM PM
		If certain construction requires work outside of these hours, all adjacent landowners have to be informed prior to any construction.	When necessary	Once – off, if necessary	PM	C SHEQO	SHEQO ECO	EM PM
		If there are complaints about low frequency noise, ESKOM would have to get a noise expert to do measurements and recommend mitigation.	When necessary	If necessary	PM	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
1	Noise	Same as Construction Phase.						

Operational Phase		
1	Noise	Same as Construction Phase

## 8.18 INFRASTRUCTURE

**Table 8-19: Environmental Management Measures for Infrastructure.**

<b>Objectives</b>	<ul style="list-style-type: none"> <li>• Ensure that existing infrastructure is taken into account during planning and project execution to eliminate impacts to existing infrastructure; and</li> <li>• To avoid claims and litigation.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Planning	Demarcate all existing infrastructure on site layout plans and document condition.	One day	Monthly Inspections	PM	C SHEQO	SHEQO ECO	EM PM
<b>Construction Phase</b>								
1	Construction activities	All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties.	Throughout Project	Throughout	PM	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								

1	Re-instate all roads and infrastructure	Upon completion of the project all roads and infrastructure shall be repaired to their original state.	Post construction	Once-off	PM	C SHEQO	SHEQO ECO	EM PM
<b>Operational Phase</b>								
1	Re-instate all roads and infrastructure	Same as rehabilitation phase.						

**8.19 ARCHAEOLOGY**

**Table 8-20: Environmental Management Measures for Archaeology.**

<b>Objective</b>	<ul style="list-style-type: none"> <li>• Protection of archaeological sites and land considered to be of cultural value;</li> <li>• Protection of known sites against vandalism, destruction and theft; and</li> <li>• The preservation and appropriate management of new archaeological finds should these be discovered during construction.</li> </ul>
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No.	Activity	Mitigation Measures	Duration	Frequency	Responsible	Accountable	Consult	Informed
<b>Pre-Construction Phase</b>								
1	Planning	Ensure all known sites of cultural, archaeological, and historical significance are demarcated on the site layout plan, and marked as no-go areas.	Throughout Project	Weekly Inspection	PM	C SHEQO	SHEQO ECO	EM PM

<b>Construction Phase</b>								
1	Emergency Response	Should any heritage resources be exposed, construction in the vicinity of the finding must be stopped and a registered heritage specialist must be called to site for inspection.	When necessary	Throughout	PM	C SHEQO	SHEQO ECO	EM PM
		Under no circumstances may any heritage material be destroyed or removed from site;	Throughout Project	Throughout	PM	C SHEQO	SHEQO ECO	EM PM
		Should remains and/or artefacts be discovered on the site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the PM.	Throughout Project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
		Should any remains be found on site that is potentially human remains, the South African Police Service should also be contacted	Throughout Project	When necessary	PM	C SHEQO	SHEQO ECO	EM PM
<b>Rehabilitation Phase</b>								
		Same as construction phase.						
<b>Operational Phase</b>								
		Same as construction phase.						

## **8.20 GENERAL REQUIREMENTS DURING CONSTRUCTION**

- A physical access plan shall be compiled and the contractor shall adhere to this plan at all times. Proper planning when the physical access plan is drawn up by the Environmental Control Officer in conjunction with the Contractor shall be necessary to ensure access to all construction areas within the route corridor parameter.
- The adjacent landowners shall be informed of the starting date of construction as well as the phases in which the construction shall take place.
- The Contractor must adhere to all conditions of contract, including the Environmental Management Plan.
- Proper planning of the construction process to allow for disruptions due to rain and very wet conditions.
- Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. If necessary, some repairs should be done to prevent damage to equipment and plant.
- All manmade structures shall be protected against damage at all times and any damage shall be rectified immediately.
- Proper site management and regular monitoring of site works.
- Proper documentation and record keeping of all complaints and actions taken.
- Regular site inspections and good control over the construction process throughout the construction period.
- Appointment of an Environmental Control Officer on behalf of the Contractor to implement this EMP.
- Environmental Audits to be carried out during and upon completion of construction.

## **8.21 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 Director: Environmental Impact Evaluation within 48 hours. 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 Contract Manager/Site Supervisor shall keep abreast of all works to ensure no problems arise. The following checklist can be used as an environmental performance monitoring tool.

## **8.22 AUDITING**

### **8.22.1 Undertaking audits**

The PM shall appoint a qualified and experienced ECO to ensure implementation of and adherence to the EMP.

The ECO shall conduct audits to ensure that the system for implementation of the EMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The EMP and the Method Statements being used are the up to date versions.
- Variations to the EMP, Method Statements and non-compliances and corrective actions are documented.
- Emergency procedures are in place and effectively communicated to personnel.

The audit programme shall consist of the following at a minimum:

- First audit no later than 1 month after construction commences;
- Thereafter audits at monthly intervals, at a minimum;
- An audit one week prior to practical completion of the project is granted; and
- A post construction audit within 1 week after the contractor has moved off site.

### **8.22.2 Compliance with the EMP**

The Contractor and/or his agents are deemed not to have complied with the EMP and remedial action if:

- There is evidence of contravention of the EMP clauses within the boundaries of the site or extensions.
- Environmental damage ensues due to negligence.
- The Contractor fails to comply with corrective or other instructions issued by the PM, within a time period specified by the PM.

## 9. EMERGENCIES

The following emergency telephone numbers are provided.

- Police: 10111
- Ambulance 10177
- Netcare 911 082 911
- ER24 084 124
- Crimestop 08600 10 111

## 10. REFERENCES

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