



Eskom Holdings SOC Limited



ENVIRONMENTAL MANAGEMENT PROGRAMME, FOR THE PROPOSED EXPANSION OF ASH DISPOSAL FACILITIES AT HENDRINA POWER STATION, MPUMALANGA PROVINCE

DEA EIA Reference Number:
12/12/20/2175

Date:
July 2015

Report Version:
Final



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CONTACT DETAILS OF RESPONSIBLE PERSONS

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GLOSSARY OF TERMS AND ABBREVIATIONS

ASH DISPOSAL FACILITY:

The ash that is created from the burning of coals is transported via water (+/- 80% water: 20% ash) and through a hydraulic decant system disposed of in ash disposal facilities. The decanted water is then recycled back to the power station for re-use at the power station as a low quality water use.

CONTRACTOR:

A person or company appointed by Eskom to carry out stipulated activities.

EMERGENCY

An unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

EMISSIONS:

The release or discharge of a substance into the environment, which generally refers to the release of gases or particulates into the air.

EMPr:

Environmental Management Programme. A detailed plan of action prepared to ensure that recommendations for preventing the negative environmental impacts and where possible improving the environment are implemented during the life-cycle of a project.

ENVIRONMENT:

In terms of the National Environmental Management Act (NEMA) (No 107 of 1998), "environment" means the surroundings within which humans exist and that are made up of:

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

ENVIRONMENTAL CONTROL OFFICER:

A suitably qualified individual, approved by the competent authority, will on behalf of Eskom, on a daily basis, or a defined frequency, monitor the project compliance with conditions of the Integrated Environmental Authorisation, environmental legislation and recommendations of this Environmental Management Programme.

ENVIRONMENTAL IMPACT

A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

ESKOM'S PROJECT MANAGER:

The Eskom appointed person, appointed to act as the manager of the project on behalf of Eskom.

INCIDENT

An undesired event which may result in a significant environmental impact but can be managed through internal response.

PARTICULATE MATTER:

The collective name for fine solid or liquid particles added to the atmosphere by processes at the earth's surface and includes dust, smoke, soot, pollen and soil particles. Particulate matter is classified as a criteria pollutant, thus national air quality standards have been developed in order to protect the public from exposure to the inhalable fractions. PM can be principally characterised as discrete particles spanning several orders of magnitude in size, with inhalable particles falling into the following general size fractions:

- PM10 (generally defined as all particles equal to and less than 10 microns in aerodynamic diameter; particles larger than this are not generally deposited in the lung);
- PM10-2.5, also known as coarse fraction particles (generally defined as those particles with an aerodynamic diameter greater than 2.5 microns, but equal to or less than a nominal 10 microns); and
- Ultra fine particles generally defined as those less than 0.1 microns.

SITE MANAGER:

The Eskom appointed person, appointed to act site manager by Eskom, and is responsible for managing the construction process on site.

1 INTRODUCTION

1.1 Overview of the Proposed Project

The Hendrina Power Station, in the Mpumalanga Province currently uses a wet ashing system for the disposal of ash. Hendrina Power Station currently has five wet ash disposal facilities, of which two (Ash dam 3 and 5) are currently in operation, the other three (Ash dam 1, 2 & 4) are not in use for the following reasons:

- Having reached full capacity (Dam 1)
- Stability issues (Dam 2)
- Temporary decommissioning (Dam 4).

At the current rate of disposal on Dams 3 and 5, the rate-of-rise will exceed 4m/year in 2018, which is not acceptable in terms of structural stability. The Hendrina Power Station is anticipated to ash approximately 64.2 million m³ until the end of its life span which is currently estimated to be 2035.

It has been determined, through studies, that the existing ashing facilities are not capable to provide sufficient ash disposal capacity for this amount of ash for the full life of the station. The existing facilities (Ash Dams 3 and 5) allow for the disposal of 20.9 million m³. Therefore, Hendrina Power Station proposes to extend its ashing facilities and associated infrastructure with the following development specifications:

- Additional airspace of 43.3 million m³
- Wet ash disposal facility ground footprint of 139 ha
- Ground footprint of associated infrastructure such as Ash Water Return Dams, ash water return channels, pump stations, drainage channels, access roads, switchgear room, ash lines of 70 ha

The need for this extension is to allow the Hendrina Power Station to continue ashing in an environmentally responsible way for the duration of the operating life of the Power Station. The need for the extension is related to the deteriorating coal quality, higher load factors, the installation of the Fabric filter plant (to meet requirements in terms of the National Environmental Management: Air Quality Act (Act 39 of 2004)) and the need to extend station life.

The following diagram (**Figure 1.1**) provides an overview of the activities on site and where this project fits within the process.

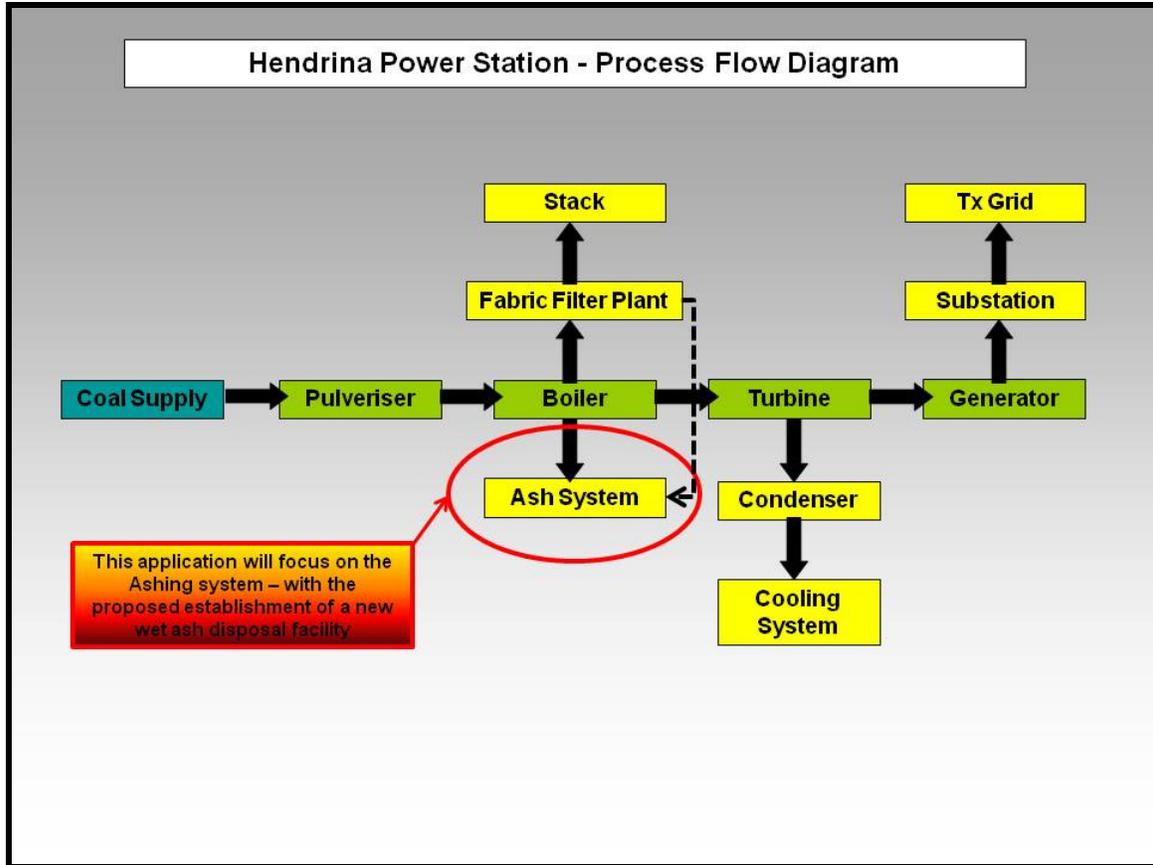


Figure 1.1: An overview of the activities on site and where this project fits within the process

1.2 Applicable Documentation

The following environmental documentation is applicable for the project, and will be read in conjunction with this EMPr:

- Hendrina Ash disposal facility Operations and Maintenance Manual, February 2010 (to be updated);
- Environmental Scoping Report for the proposed new Ashing facility at the Hendrina Power Station, Mpumalanga Province.
- Environmental Impact Assessment Report for the proposed new Ashing facility at the Hendrina Power Station, Mpumalanga Province.
- Environmental Authorisation issued by the National Department of Environmental Affairs (DEA) (still to be issued).
- All relevant Operational Control documents forming part of the Eskom Hendrina Power Station Environmental Management System.

1.3 Structure of the Environmental Management Programme

The EMPr provides mitigation and management measures for the following phases of the project:

- *Construction Phase*
This section of the EMP provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required within the construction phase are specified. These specifications will form part of the contract documentation and, therefore, the Contractor will be required to comply with the specifications to the satisfaction of the Project Manager and Environmental Control Officer, in terms of the construction contract.
- *Operation and Maintenance Phase*
This section of the EMP provides management principles for the operation and maintenance phase of the project. Environmental actions, procedures and responsibilities as required from Eskom within the operation and maintenance phase are specified. The operations phase will be aligned and managed in line with the station's EMS.
- *Decommissioning Phase*
This section includes principles for the decommissioning phase of the project as well as some reference to the ongoing rehabilitation requirements of the ash disposal facility. This section of the EMP will be required to be revisited and updated at the time of decommissioning.

All relevant environmental legislation pertaining to the project is listed in **Section 3**. The Contractor and the client are required to comply with this legislation for all phases of the project. This list is intended to serve as a guideline and is not exhaustive.

This EMPr is a dynamic document which will be updated as required on a continuous basis. Any amendments made, must be submitted to both the Environmental Control Officer (ECO) and Project Manager for approval prior to implementation and incorporation into the operations EMS.

1.4 Objectives of the EMPr

The EMPr has the following objectives:

- To outline functions and responsibilities of responsible persons.
- To state standards and guidelines, which are required to be achieved in terms of environmental legislation.
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of

environmental impacts, and to manage environmental impacts associated with the proposed new ash disposal facility at Hendrina power station.

- To prevent long-term or permanent environmental degradation.

2 MANAGEMENT PROCEDURES

2.1 Organisational Structure and Responsibility

2.1.1 Functions and Responsibilities

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager, Site Manager and Environmental Control Officer for the construction phase of this project are as detailed below.

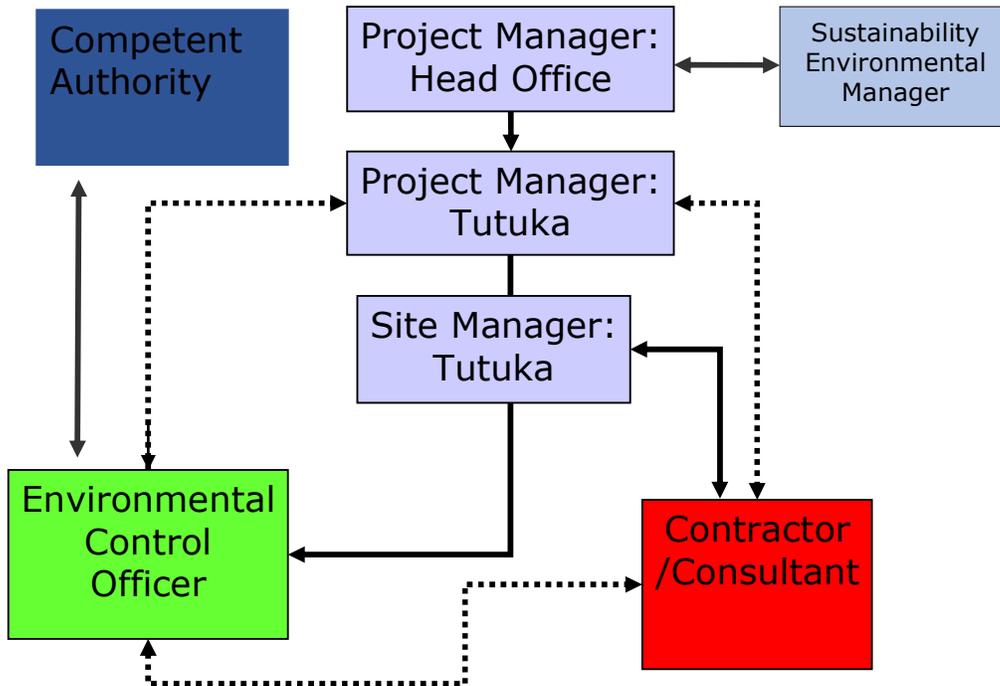


Figure 2: Functions and Responsibilities

The Project Manager (Hendrina Power Station) will:

- Ensure that Eskom and the Contractor are aware of all specifications, legal constraints and Eskom standards and procedures pertaining to the project specifically with regards to the environment.
- Ensure that all stipulations within the Environmental Authorisation (EA) and the EMPr are communicated and adhered to by Eskom and its Contractor(s).
- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Be fully conversant with the Environmental Impact Assessment for the project, the conditions of the EA, and all relevant environmental legislation

- Review and approve Methods Statements before construction works is done (working with Environmental Control Officer).

The Site Manager will:

- Be fully conversant with the Environmental Impact Assessment.
- Be fully conversant with the conditions of the Environmental Authorisation and the EMPr.
- Be fully conversant with the Environmental Management Programme.
- Be fully conversant with all relevant environmental legislation and Eskom environmental policies and procedures, and ensure compliance with these.
- Have overall responsibility for the implementation of the EA and EMPr.
- Ensure that audits are conducted to ensure compliance to the EA and EMPr.
- Liaise with the Project Manager or his delegate, the Environmental Control Officer and others on matters concerning the environment.
- Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site
- Approve Methods Statements before construction works is done (working with the Environmental Control Officer and in consultation with the project manager).

The Environmental Control Officer:

- Eskom must appoint a suitably qualified Environmental Control Officer (ECO), as per the requirements of the Competent Authority, who would, on a daily basis, or on a defined frequency, monitor the project compliance with conditions of the Environmental Authorisation, environmental legislation and recommendations of the EMPr.
- The costs of the ECO services shall be borne by Eskom.
- The ECO must be appointed one month before the start of construction, and the authorities must be notified of such an appointment for communication purposes.

The Environmental Control Officer shall:

- Be fully conversant with the Environmental Impact Assessment Report (EIR).
- Be fully conversant with the conditions of the Integrated Environmental Authorisation (IEA) and the EMPr.
- Be fully conversant with the Environmental Management Programme.
- Approve Methods Statements (giving support to Site/Project Manager)
- Be fully conversant with all relevant environmental legislation and Eskom environmental policies and procedures, and ensure compliance with them.
- Ensure that periodic environmental performance audits are undertaken on the project implementation.

- Submit an environmental compliance report at a frequency determined by the Competent Authority stipulated in the EA, in writing, to the Director-General of the DEA, copied to the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET)
- Maintain the following on site:
 - A daily site register
 - A non-conformance register (NCR)
 - A public complaint register
 - A register of audits
- Remain employed until the completion of the construction phase.
- Report to project manager.
- Convey the contents of this document to the site staff and discuss the contents in detail with the Project Manager and Contractor.
- Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr.
- Take appropriate action if the specifications contained in the EMPr are not followed.
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible.
- Ensure that activities on site comply with all relevant environmental legislation.
- Compile progress reports on a regular basis, with input from the Site Manager, for submission to the Project Manager, including a final post-construction audit carried out by an independent auditor/consultant.

Sustainability Environmental Manager shall:

- Provide overall assurance to Eskom Senior Management that environmental issues are appropriately addressed and managed at the construction site
- Provide overall assurance to the Divisional Executive: Generation that conditions in the EA and EMPr are adhered to
- Ensure that appropriate reporting of environmental performance/issues takes place
- Where necessary, liaise on a strategic level with environmental authorities on IEA/EMPr-related issues (insofar as construction-related non-compliance is concerned)

Contractors and Service Providers:

All contractors (including subcontractors and staff) and service providers are ultimately responsible for:

- Complying with the Environmental Management Programme;
- Provide a Method Statement for approval by either Project Manager or Site Manager, together with Environmental Control Officer, as early in advance as possible to allow the review and approval process;

- Adhering to any environmental instructions issued by the Site Manager/Project Manager on the advice of the ECO, or from the ECO;
- submitting a report, in a format and frequency as decided upon by the Project/Site Manager, which will document all incidents that have occurred during the period before the site meeting
- Arrange that all his employees and those of his subcontractors receive training. Training has to be appropriate for the level of the tasks and functions undertaken.

2.2 Awareness and Competence

It is important to ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental harm.

To achieve effective environmental management, it is important that employees, Contractors and Subcontractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr and the relevant Eskom procedures. Environmental training must include the following:

- Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment;
- Employees will be thoroughly familiar with the requirements of the EMPr and the environmental specifications as they apply to the new ash disposal facility.
- Employees must undergo training for the operation and maintenance activities associated with new ash disposal facility and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Records must be kept of those that have completed the relevant training.
- Training must include the environment, health and safety as well as basic HIV/AIDS education.

Training can be done either in a written or verbal format but will be in an appropriate format for the receiving audience. Persons having received training must indicate in writing that they have indeed attended a training session and have been notified in detail of the contents and requirements of the EMPr. The attendance registers must be kept on file.

2.3 Monitoring

The existing monitoring programmes at the Hendrina Power Station will be utilised to ensure conformance with the EMPr through the contract/work instruction specifications.

The Environmental Control Officer at the power station will ensure compliance with the EMPr, and will manage the monitoring activities. The Environmental Control Officer will report to the Site Manager should any non-compliance be evident or corrective action be necessary. Only in severe cases of non-compliance, or repeated offences, will the Environmental Control Officer be required to report to the Project Manager.

All instruments and devices used for the measurement or monitoring of any aspect of this EMPr must be calibrated and appropriately operated and maintained. Calibration records must be kept on site or in close proximity to the equipment for ease of availability.

2.4 Non-Conformance and Corrective Action

The auditing of the construction or operation of the new ash disposal facility and its associated infrastructure may identify non-conformances of the EMPr. Non-conformances may also be identified through incidents, emergencies or complaints. In order to correct these non-conformances, the source must be determined and corrective actions must be identified.

2.4.1 Compliance with the Environmental Management Programme Specifications and/or Environmental Authorisation conditions

- The EA and EMPr will be available on-site at all times.
- All persons employed by the Contractor or his sub-contractors will abide by the requirements of the EA and EMPr.
- Any members of the construction workforce found to be in breach of any of the specifications contained within the EMPr may be ordered by the Site Manager to leave the site. The order may be given orally or in writing. Confirmation of an oral order will be provided as soon as practically possible, but the absence of a written order will not be cause for an offender to remain on site. Any extension of time required for any delay or disadvantage to the Contractor brought about by an offender ordered to leave the site may be negotiated with the Project Manager or Site Manager.
- The Contractor will not direct a person to undertake any activity which would place them in contravention of the specifications contained within the EMPr.
- Should the Contractor be in breach of any of the specifications contained in the EMPr, the Site Manager will, in writing, instruct the Contractor responsible for the incident of non-compliance regarding corrective and/or remedial action required, specify a timeframe for implementation of these actions, implement a penalty and/or indicate that work will be suspended should non-compliance continue. *Contractual terms will supersede this.*
- Should non-compliance continue, further written notification will be forwarded to the Contractor responsible for the incident of non-compliance outlining the required corrective and/or remedial action, the timeframe for implementation, penalties

and/or work will be suspended as specified previously. *Contractual terms will supersede this.*

- The Contractor will be responsible and will bear the cost of any delays, corrective or remedial actions required as a result of non-compliance with the specifications and clauses of the EMPr.
- Departmental officials/Authorities will be given access to the property referred to in the EA for the purpose of assessing and/or monitoring compliance with the conditions contained in the EA, at all reasonable times.

2.5 Documentation and Reporting

The following documentation must be kept on site in order to record compliance with the EMPr:

- Integrated Environmental Authorisation;
- Waste Management Licence;
- Water Use Licence;
- Record of Complaints
- Record of Emergencies and Incidents.

The Contractor will report on the following

- Incidents involving Contractor/power station employees and/or the public.
- Environmental complaints and correspondence received from the public to the Site Manager or the Environmental Control Officer.
- Incidents that cause harm or may cause harm to the environment.

The above records will form an integral part of the Contractors' Records. These records will be kept with the EMPr, and will be made available for scrutiny if so requested by the Site Manager or his delegate and the Environmental Control Officer.

The Contractor will ensure that the following information is recorded for all complaints/incidents/emergencies:

- Nature of complaint/incident/emergency.
- Causes of complaint/incident/ emergency.
- Party/parties responsible for causing complaint/incident/ emergency.
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint/incident/ emergency.
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident/ emergency.
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions.

- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented.
- Copies of all correspondence received regarding complaints/incidents/emergency.

2.6 Public Notification and Communication

A signboard must be erected at the entrance to the construction site, informing the public of the construction activities taking place. The signboard must include the following information:

- The name of the contractor
- The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.

Any public communication undertaken must be done in line with Hendrina Power Station's communication strategy in terms of ISO 14001.

3 ENVIRONMENTAL GUIDELINES, STANDARDS AND PERMITS

3.1 Legal Summary

The following is a summary of the applicable environmental legislation for the New Ash disposal facility at the Hendrina Power Station.

APPLICABLE LEGISLATION ALREADY IN EFFECT AT DATE OF THIS EMPr
National Legislation
• National Environmental Management: Air Quality Act No 39 of 2004
• National Environmental Management: Waste Act No 59 of 2008
• Hazardous Substances Act No 15 of 1973
• GN R1179 (GG 16536 of 25 August 1995) – Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act No 85 of 1993;
• National Water Act No 36 of 1998
• Constitution of South Africa, 1996
• National Environmental Management: Biodiversity Act No 10 of 2004
• Conservation of Agricultural Resources Act No 43 of 1989
• National Forest Act No 84 of 1998
• National Veld and Forest Fire Act No 101 of 1998
• National Heritage Resources Act No 25 of 1999
• National Environmental Management Act No 107 of 1998
• Promotion of Access to Information Act No 2 of 2000 (in respect of record-keeping and interested and affected parties and monitoring of environmental impacts)

3.2 Environmental Guidelines and Standards

All applicable environmental standards contained within the environmental legislation will be adhered to. At the time of compiling this EMPr, the following environmental guidelines and standards were identified as being applicable.

3.2.1 Air Quality Guidelines

Currently air pollution in South Africa is regulated under the National Environmental Management: Air Quality Act 39 of 2004, which replaced the Atmospheric Pollution Prevention Act 45 of 1965 (APPA). The new Act was signed by the President and gazetted in February 2005 and sections of the act have come into force subsequently.

3.2.2 Control of Alien Vegetation

In terms of Government Notice R1048, the following regulations are applicable with regards to the control of invasive alien vegetation and declared weeds:

- It is illegal to have declared weed species or invasive alien vegetation on one's property.
- The landowner must immediately take steps to eradicate them by using the methods prescribed in the regulations, namely:
 - uprooting and burning, or
 - the application of a suitable chemical weed-killer (herbicide), or
 - any other method of permanent eradication.
- One may not uproot or remove such plants and dump or discard them elsewhere to re-grow or allow their seeds to be spread or blown onto other properties.
- If the landowner does not comply with requirements above, a person may be found guilty of a criminal offence.

3.2.3 Waste Disposal

All waste (general and hazardous) generated during the construction phase may only be disposed of at appropriately licensed waste disposal sites (in terms of the National Environmental Management: Waste Act No 59 of 2008 or Environment Conservation Act No 73 of 1989).

3.3 Environmental Permitting Requirements

Environmental permits, which will be required to be obtained for construction and operation, are discussed briefly below. These will be required to be obtained before construction commences.

3.3.1 Water Use License

Although Eskom have an existing water license, it will have to be amended by the addition of an application in terms of sections 21(c) and 21(i) due to the presence of wetlands on the preferred site.

"Altering the bed, banks, course or characteristics of a watercourse" means any change affecting the resource quality within the riparian habitat or 1:100 year floodline, whichever is the greater distance at the date of commencement of this notice"

This notice does not apply to the use of water in terms of section 21(c) and (i) for the rehabilitation of a wetland. The notice also does not apply to the use of water in terms of section 21(c) and (i) within a 500 metre radius from the boundary of any wetland

Disposing of waste in a manner which may detrimentally impact on a water resource – Section 21(g)

A waste related water use licence application would be applicable under Section 21(g) for the Ash Disposal Facility.

3.3.2 Heritage Sites

In terms of the National Heritage Resources Act (No 25 of 1999), a permit is required to be obtained for the disturbance, removal or destruction of any national and provincial heritage sites, archaeological and palaeontological sites, burial grounds and graves and public monuments and memorials. This is particularly applicable to the grave that were found on the proposed site.

During construction if any heritage, archaeological or paleontological artefacts are discovered, construction should cease, the area cordoned off and an appropriate specialist consulted.

3.3.3 Public Health

Ablution facilities must be approved by the nearest local authority in terms of their by-laws and relevant provincial standard by-laws. These facilities do not fall under provisions of the National Water Act (No 25 of 1999). Chemical toilets must be provided on site during the construction phase and must be emptied at regular intervals. No other types of ablution facilities are permitted on site.

4 CONSTRUCTION

4.1 Contractor Selection and Performance

- Eskom must ensure that this EMPr forms part of any contractual agreements with sub-contractors for the execution of the proposed project
- The contractor must monitor the performance of the construction team from time to time to ensure compliance with the requirements of this EMPr

4.2 Legal and Other Requirements

- Eskom and the Contractor must comply with the relevant provisions of the applicable environmental legislation and associated regulations promulgated in terms of these laws.

4.3 Social Interaction

- All neighbours must be notified and advised of the timing of the intended blasting or extreme noise activities.
- Hendrina power station will deal with community complaints, in accordance with the station's communication strategy in terms of ISO 14001.
- Contractors must prevent and prohibit their employees from entering neighbouring land and homes.
- All construction activities must take place within the demarcated footprint.
- Movement of construction personnel on site, outside of the demarcated development areas, must be strictly prohibited.

4.4 Labour

It is acknowledged that disposal of the ash onto the ash disposal facility takes place 24 hours a day, however **construction** should take place under the following conditions:

- Normal working hours must be maintained as far as possible.
- Night-time activities should be limited as far as possible, and construction activities must be contained to reasonable hours during the day and early evening as far as possible.

4.5 Employment – Local Preference

- As far as possible, Eskom should encourage its contractors to give employment preference to residents of the Pullenshope, Hendrina and Middelburg areas in accordance with approved agreements and procedures.

4.6 Safety and Security

4.6.1 General Procedures

All provisions of the Occupational Health and Safety Act, 85 of 1993, and any other applicable legislation, must be adhered to by Eskom and its contractors.

4.7 Emergency Response

Contractors must comply with the Eskom Emergency Preparedness and Response Procedure.

4.8 Fire Control

Element	Management Plan
Sources	Open fires / flames on site
Controls	<ul style="list-style-type: none"> • All construction personnel will receive training on fire hazards and techniques to extinguish any fire that may be initiated on the site. • The equipment required to extinguish any fires that may be initiated by construction activities must be installed on the site. • Flammable materials will be stored under conditions that will limit the potential for ignition and the spread of fires. • Burning of vegetation cut during site clearing and establishment will not be permitted. All cleared vegetation will be removed to a landfill site designated by the ECO. • The Contractor will supply fire-fighting equipment in proportion to the fire risk presented by the type of construction and other on-site activities and materials used on site. This equipment will be kept in good operating order. • No fires must be allowed at the construction site. • Any welding or other sources of heating of materials must be done in a controlled environment, wherever possible and under appropriate supervision, in such a manner as to minimise the risk of veld fires and/or injury to staff. • The Contractor will take reasonable and active steps to avoid increasing the risk of fire through his activities on site. Accidental fires must be prevented through proper sensitisation of employees towards the associated risks, dangers and damage of property. • The use of open fires for cooking of food, is prohibited. • Restrict smoking activities to demarcated smoking areas.
Corrective Action	<ul style="list-style-type: none"> • Report any fires which occur to the Fire department immediately
Specific Specialist Input	<ul style="list-style-type: none"> • Prevent all open fires; • Provide demarcated fire-safe zones, facilities and suitable fire control measures

4.9 Site Establishment and Management

4.9.1 Construction Camp and Construction Staff

In the event that an external contractor is required for portions of the construction phase, the following will apply.

Prior to the establishment of a site camp, the Contractor will produce a layout plan showing the positions of all buildings, ablutions, vehicle wash areas, fuel and cement storage areas and other infrastructure for approval of the Site Manager. If possible, it is considered preferable to locate the site camp as close as possible to the construction site, preferably on Eskom Property.

Construction staff must be adequately educated by the Environmental Control Officer or the Site Manager as to the provisions included in the EMPr and general environmentally friendly practice.

The following activities must be prohibited at site camp(s), and by the construction staff in general:

- Indiscriminate disposal of rubbish or rubble.
- Littering of the site.
- Spillage of potential pollutants, such as petroleum products.
- Collection of firewood.
- No fires allowed on site.
- Interference with any wildlife, fauna or flora.
- Use of any ablution facility other than those provided.
- Burning of wastes and cleared vegetation under any circumstances.
- Entering areas outside of the demarcated construction area without relevant permissions.

4.9.2 Sanitation

Element	Management Plan
Controls	<ul style="list-style-type: none"> • A minimum of one chemical toilet must be provided per 15 persons per shift. • Suitable toilets will be provided for the staff at all points at which workmen are carrying out duties under the contract • Toilets must be strategically placed (easily accessible to workers) and will not be situated within 150m of any borehole or drainage line. • Toilets must be secure, clean and functional throughout the construction period. • All ablution activities must take place in these facilities, and the waste material must be stored and disposed of at the registered waste disposal site or collected by a suitable waste contractor on a regular basis. Safe disposal certificates are to provided. • The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied. • All temporary/portable toilets must be secured to the ground to

Element	Management Plan
	<p>prevent them from toppling due to wind or any other cause.</p> <ul style="list-style-type: none"> The Contractor will ensure that the entrances to toilets are adequately screened from public view. Discharge of waste from toilets into the environment and burying of waste is strictly prohibited.
Monitoring	<ul style="list-style-type: none"> The Contractor will monitor that toilet facilities are used by personnel and that use of non-designated areas is actively discouraged.
Specific Specialist Input	<ul style="list-style-type: none"> Provide temporary on-site ablution, sanitation, litter and waste management and hazardous materials management facilities; Abluting anywhere other than in provided toilets shall not be permitted. Under no circumstances shall use of the veld be permitted

4.9.3 Site Management

Element	Management Plan
Controls	<ul style="list-style-type: none"> The Contractor must take responsibility for the camp to conform to all contractual aspects and environmental standards applicable. This includes aspects related to stormwater management and waste management. The Contractor must provide adequate refuse bins that must be cleaned/emptied and the waste removed from site on a regular basis. The construction camp must be kept neat and tidy at all times. Water sources available for drinking water etc. must be pointed out by the ECO. It is not advisable that a contractor makes use of or collects water from any other source other than those pointed out to them as being suitable for use. No Food preparation on site.
Monitoring	<ul style="list-style-type: none"> Site inspections

4.9.4 Site Access

Element	Management Plan
Controls	<ul style="list-style-type: none"> Access in and out of the site must be allowed only at one point to minimise impacts during construction. Construction activities must be limited to areas which are deemed to be safe, and deemed as the minimum area needed for the construction activity. All sites that are identified by the Site Manager as being unsafe will be indicated as such with warning signs in all relevant languages. Livestock/domestic animals will be not be permitted access to construction sites.
Monitoring	<ul style="list-style-type: none"> Inspection and auditing
Specific Specialist Input	<ul style="list-style-type: none"> Access is to be established by vehicles passing over the same track on natural ground. Multiple tracks are not permitted; Vehicular traffic shall not be allowed in permanently wet areas, no damage shall be caused to wet areas. Where necessary, alternative

	<p>methods of construction shall be used to avoid damage to wet areas;</p> <ul style="list-style-type: none"> • The Contractor shall select a suitable level area free of rock and large bushes as lay down area; • The Contractor shall select an area a suitable distance from any sensitive environmental feature as a construction camp
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4.9.5 Site Clearing

Element	Management Plan
Controls	<ul style="list-style-type: none"> • The size of area subjected to land clearance will be kept to a minimum. • Only areas as instructed by the Site Manager must be cleared and grubbed. • Cleared vegetation debris which has not been utilised or collected by local communities will be collected and disposed of to a suitable waste disposal site. It will not be burned on site. • No vegetation will be cut or collected off construction sites for burning or for any other purpose without the prior permission of the Site Manager. • All vegetation not required to be removed will be protected against damage.
Monitoring	<ul style="list-style-type: none"> • Inspection
Specific Specialist Input	<ul style="list-style-type: none"> • Demarcate all construction areas by semi-permanent means in order to control movement of personnel, vehicles, providing boundaries for construction sites in order to limit spread of impacts; • No painting or marking of rocks or vegetation to identify locality or other information shall be allowed, as it will disfigure the natural setting. Marking shall be done by steel stakes with tags, if required; • Marking of construction plant should be done by means of semi-permanent (removable) marker tape.

4.9.6 Plant Repair, Maintenance & Cleaning

Element	Management Plan
Controls	<ul style="list-style-type: none"> • No vehicle maintenance and repairs will be undertaken on site, except for emergency repairs only. • Drip trays etc. are to be provided by the contractor, this also applies to the storage of vehicles overnight. • Adequate collection facilities such as diversion mounds, ditches, drains, oil separation sumps and sedimentation ponds will be constructed at each location with a pollution potential. • All emergency repair work away from bunded areas will make use of drip trays. • Regular inspections will be carried out to detect leaks and spillages on vehicles and machinery.
Monitoring	<ul style="list-style-type: none"> • Inspections

4.10 Noise

Element	Management Plan
Potential Impact	Nuisance noise from construction activities affecting the surrounding areas
Sources	<ul style="list-style-type: none"> • Site preparation and earthworks • Construction related transport • Building (e.g. day walls) activities
Controls	<ul style="list-style-type: none"> • Noise control measures must be implemented by the contractor. All noise levels must be controlled at the source. • All employees must be given the necessary ear protection gear, if necessary. • Affected parties must be informed of any excessive noise factors. • No loud music is allowed on site and in construction camps. • A speed restriction of 40km/h will be imposed on all construction vehicles on site, in order to limit additional noise generated by these vehicles. Final speed limits must be in line with the power stations rules. • The ECO will be advised in advance when unavoidable out-of-hours work will occur. • Noise from vehicles and on-site powered machinery and equipment will not exceed the manufacturer's specifications, based on the installation of noise attenuation measures.
Maintenance	<ul style="list-style-type: none"> • All construction equipment must be maintained in good working order. • Silencers on construction equipment will be maintained to ensure no deterioration in noise-dampening capacity.
Corrective Actions	<ul style="list-style-type: none"> • The Contractor will respond timeously in the event of any complaints by local residents or others about disturbing noise. The noise source will be identified and appropriate noise mitigatory measures instituted in consultation with the affected party (ies). • In the case of legitimate complaints the noise level must be tested by a specialist

4.11 General Biodiversity – Specific Specialist Input

Element	Management Plan
Specific Specialist Controls	<ul style="list-style-type: none"> • Exclude all areas of high ecological sensitivity from development activities that would result in irreversible transformation of the habitat. This should be done during the planning phase of the project. High sensitivity areas can be identified in the EIA documentation; • Allow for a suitable buffer in order to provide some protection of sensitive areas against peripheral impacts. All areas that were ascribed a High Ecological Sensitivity should be buffered against potential impacts; • Appoint an Environmental Control Officer (ECO) prior to start of construction. Responsibilities should include, but not be limited to, ensuring adherence to EMPr guidelines, guidance of activities, planning, reporting; • Compile and implement environmental monitoring programme, the aim of which should be ensuring long-term success of rehabilitation and prevention of environmental degradation. Environmental monitoring

	<p>should be conducted at least twice per year (Summer, Winter);</p> <ul style="list-style-type: none"> • Limit construction, maintenance and inspection activities to dry periods in order to curb occurrence/ augmentation of erosion in areas of existing erosion, destabilizing of substrate in areas of high slopes, drainage lines, etc; • Ensure off site storage of hazardous materials, chemicals, fuels, oils, etc. in order to prevent accidental spillage, contamination or pollution; • Develop emergency maintenance operational plan to deal with any event of contamination, pollution or spillages, particularly in sensitive areas; • Included in the monitoring programme should be a periodic assessment of possible leaching or spillage of any chemical into any natural water system (groundwater or surface water) occurs.
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4.12 Vegetation

4.12.1 *Vegetation Clearing*

All vegetative matter will be physically removed from all areas where construction is to take place. All cleared areas will be stabilised as soon as possible in order to minimise the risk of erosion.

In terms of the Environment Conservation Act (No 73 of 1989), the disposal of vegetation by burying or burning is prohibited. No vegetative matter will be burnt or removed for firewood by any Eskom employee or contractor prior to the necessary permission from the relevant authorities. The use of herbicides will 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.

The Contractor will ensure:

- The areas needing to be cleared and the degree of clearing required must be determined and demarcated in consultation with the ECO before clearing begins.
- The ECO must be present during vegetation clearing.

The Contractor will ensure that all works are undertaken in a manner, which minimises the impact on vegetation outside of the site area as designated in the construction site layout. However, it may be necessary in certain instances to remove or prune vegetation outside of the development in order to prevent possible damage to the facilities. This must be undertaken in consultation with the Site Manager.

Specific Specialist Input

Element	Management Plan
Specific Specialist Input	<ul style="list-style-type: none"> • Removal of vegetation/ plants shall be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible; • Remove and store topsoil separately in areas where excavation/ degradation takes place. Topsoil should be used for rehabilitation purposes in order to facilitate regrowth of species that occur naturally in the area; • Disturbance of vegetation must be limited to areas of construction; • The removal or picking of any protected or unprotected plants shall not be permitted and no horticultural specimens (even within the demarcated working area) shall be removed, damaged or tampered with unless agreed to by the ECO; • Cut vegetation (grass and shrubs) only if required. No clearing of vegetation or soil by grading machinery shall be undertaken; • The establishment and regrowth of alien vegetation must be controlled after the removal of grass; • All declared aliens must be identified and managed in accordance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983); • Ensure proper surface restoration and re-sloping in order to prevent erosion, taking cognisance of local contours and landscaping; • Exposed areas with slopes less than 1:3 should be rehabilitated with a grass mix that blends in with the surrounding vegetation; • The grass mix should consist of indigenous grasses adapted to the local environmental conditions; • The re-vegetated areas should be temporarily fenced to prevent damage by grazing animals; • Re-vegetated areas showing inadequate surface coverage (less than 30 % within eight months after re-vegetation) should be prepared and re-vegetated from scratch; • Damage to re-vegetated areas should be repaired promptly; • Exotic weeds and invaders that might establish on the re-vegetated areas should be controlled to allow the grasses to properly establish; • Monitoring the potential spread of declared weeds and invasive alien vegetation to neighbouring land and protecting the agricultural resources and soil conservation works are regulated by the Conservation of Agricultural Resources Act, No. 43 of 1983 and should be addressed on a continuous basis.

4.12.2 Alien Vegetation

Monitoring the potential spread of declared weeds and invasive alien vegetation to neighbouring land and protecting the agricultural resources and soil conservation works are regulated by the Conservation of Agricultural Resources Act (No 43 of 1983) and must be addressed on a continual basis, through an alien vegetation control and monitoring programme.

In view of the fact that the presence of declared weeds is illegal, the landowner/manager must comply with the following legally prescribed requirements (refer to Sections 1, 2, 5 and 6 of the Conservation of Agricultural Resources Act (No 43 of 1983), as well as government notice GN R1048):

- a. The landowner/manager must take steps to eradicate the declared weeds by using the methods prescribed in the regulations, namely
 - uprooting and burning, or
 - the application of a suitable chemical weed-killer (herbicide), or
 - any other method which will ensure their permanent eradication.
- b. One may not uproot or remove such plants and dump or discard them elsewhere to re-grow or to allow their seeds to be spread or blown onto other properties.
- c. If the landowner/manager does not comply with the requirements under a) and b) above, he/she is guilty of a criminal offence.

The Contractor will remove all alien vegetation on the SIP Site as listed in the Conservation of Agricultural Resources Act (No 43 of 1983), or as directed by the Environmental Control Officer during the construction period.

An alien control and monitoring procedure is in place at Eskom and must be complied with during the construction phase and operational phase.

4.12.3 *Herbicide Use*

The use of herbicides will be in compliance with the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947). In terms of this Act, a registered pest control operator will apply herbicides, or will supervise the application of herbicides. Herbicide use will only be allowed with the approval of Eskom. The application will be according to set specifications and under supervision of a qualified technician.

Therefore, the Contractor will:

- Ensure that a registered pest control operator applies or supervises the application of all herbicides.
- Ensure that all Eskom's policies on the use and application of herbicides will be adhered to.
- Ensure that all herbicides are stored in a well-ventilated demarcated storage area.
- Ensure that a register of all contents of the storage area is kept and updated on a regular basis.
- Ensure that a daily register of all relevant details of herbicide usage is kept, and that such a register is maintained by the relevant Eskom custodian.

4.12.4 *Risk of Fire*

- Accidental fires should be prevented through proper sensitisation of the contractors and their workers towards the associated risks, dangers and damage of property.
- An emergency preparedness plan should be in place to fight accidental veld fires, should they occur. The adjacent land owners/users/managers should also be informed and/or involved.
- The use of open fires for cooking of food etc. by construction personnel should be strictly prohibited. Enclosed areas for food preparation must be provided.
- Use of branches of trees and shrubs for fire making purposes must be strictly prohibited.

4.13 Fauna

Element	Management Plan
Potential Impacts	Impact on both terrestrial fauna and avifauna as a result of habitat destruction due to construction activities.
Sources	<ul style="list-style-type: none"> • Construction camp and labour • Mobile construction equipment • Traffic to and from site
Controls	<ul style="list-style-type: none"> • No disturbing, injuring or killing of any fauna (including snakes) for any purposes. • No feeding of wildlife. • No domestic animals are to be brought onto the site. • The construction site will be kept clean and tidy and free from rubbish which would attract animal pest species. • Eskom will advise all contractors and subcontractors of the penalties associated with the needless destruction of wildlife, as set out in the Animals Protection Act (Act 71 of 1962) sec. 2 (fine R2 000 and/or 12 months imprisonment).
Corrective actions	<ul style="list-style-type: none"> • The Contractor will, as soon as reasonably possible, but within 24 hours of becoming aware of a complaint relating to wildlife interaction, respond to the complaint and register the complaint in the Environmental Register. In addition, the complaint must be reported to the ECO as well as to the Project / Site manager as soon as possible such that the incident can be investigated by the ECO. • In the event that a snake or any other problem animal is encountered, the relevant, trained personnel must be called in to remove the problem animal.
Specific Specialist Input	<ul style="list-style-type: none"> • No animal may be hunted, trapped, snared or killed for any purpose whatsoever; • No pets whatsoever should be allowed in or near the project area. Any pets found anywhere related to the project must be confiscated and the guilty party fined accordingly; • Vehicular traffic should not be allowed after dark in order to limit accidental killing of nocturnal animals; • Dangerous animals should be handled by a competent person; • Compile a graphic list of potentially dangerous animals and present this to all workers as part of site induction.

Element	Management Plan
	<ul style="list-style-type: none"> • Ensure effective policing of fences and areas bordering the development area (at least weekly), advocate severe fines and resolute punishment of offenders (there must be strong focus on warnings at the site); • The construction of fences around all areas related to the project where personnel have daily access (construction, operation and decommission) is of the utmost importance. Regular inspection of these fences to ensure the fences' integrity and patrol of the borders and surrounding areas next to the site for the presence of snares etc. will limit the impact of poaching and snaring. Communication with farmers whose farms border the operational areas to create awareness of potential poaching problems in the area is important; and • Ensure that a snake handler and/ or anti venom serum is available at all times, together with a competent person to administer this serum

4.14 Avifauna – Specific Specialist Input

- **Ash disposal facility**

Impact	Mitigation
Construction Phase	
Habitat destruction	Strict control should be maintained over all activities during construction, in particular heavy machinery and vehicle movements, and staff. It is difficult to mitigate properly for this as habitat destruction covering the entire ash disposal facility footprint is inevitable. However, it is important to ensure that the construction Environmental Management Programme incorporates guidelines as to how best to minimize this impact, and ensure that only designated areas are impacted upon, as per the design.
Disturbance	Strict control should be maintained over all activities during construction. It is difficult to mitigate properly for this as some disturbance is inevitable. During Construction, if any of the "Focal Species" identified in the avifauna report are observed to be roosting and/or breeding in the vicinity, the EWT is to be contacted for further instruction. The focal species list is available in Appendix A.

- **Transmission Lines**

Impact	Mitigation
Construction Phase	
Habitat destruction	Strict control should be maintained over all activities during construction, in particular heavy machinery and vehicle movements, and staff. It is difficult to mitigate properly for this as some habitat destruction is inevitable. It is important to ensure that the construction Environmental Management Programme

	incorporates guidelines as to how best to minimize this impact.
<i>Disturbance</i>	Strict control should be maintained over all activities during construction. It is difficult to mitigate properly for this as some disturbance is inevitable. During Construction, if any of the "Focal Species" identified in the avifauna report are observed to be roosting and/or breeding in the vicinity, the EWT is to be contacted for further instruction. The focal species list is available in Appendix A

- ***New Pipe lines.***

<i>Impact</i>	<i>Mitigation</i>
<i>Construction Phase</i>	
Habitat destruction	Strict control should be maintained over all activities during construction, in particular heavy machinery and vehicle movements, and staff. It is difficult to mitigate properly for this as some habitat destruction is inevitable. It is important to ensure that the construction Environmental Management Programme incorporates guidelines as to how best to minimize this impact.
<i>Disturbance</i>	Strict control should be maintained over all activities during construction. It is difficult to mitigate properly for this as some disturbance is inevitable. During Construction, if any of the "Focal Species" identified in the avifauna report are observed to be roosting and/or breeding in the vicinity, the EWT is to be contacted for further instruction. The focal species list is available in Appendix A

Figure 4.1 below shows the proposed power-line deviation alternatives, as well as sensitive zones (see red dotted polygons), through which overhead power-line sections may require collision mitigation.

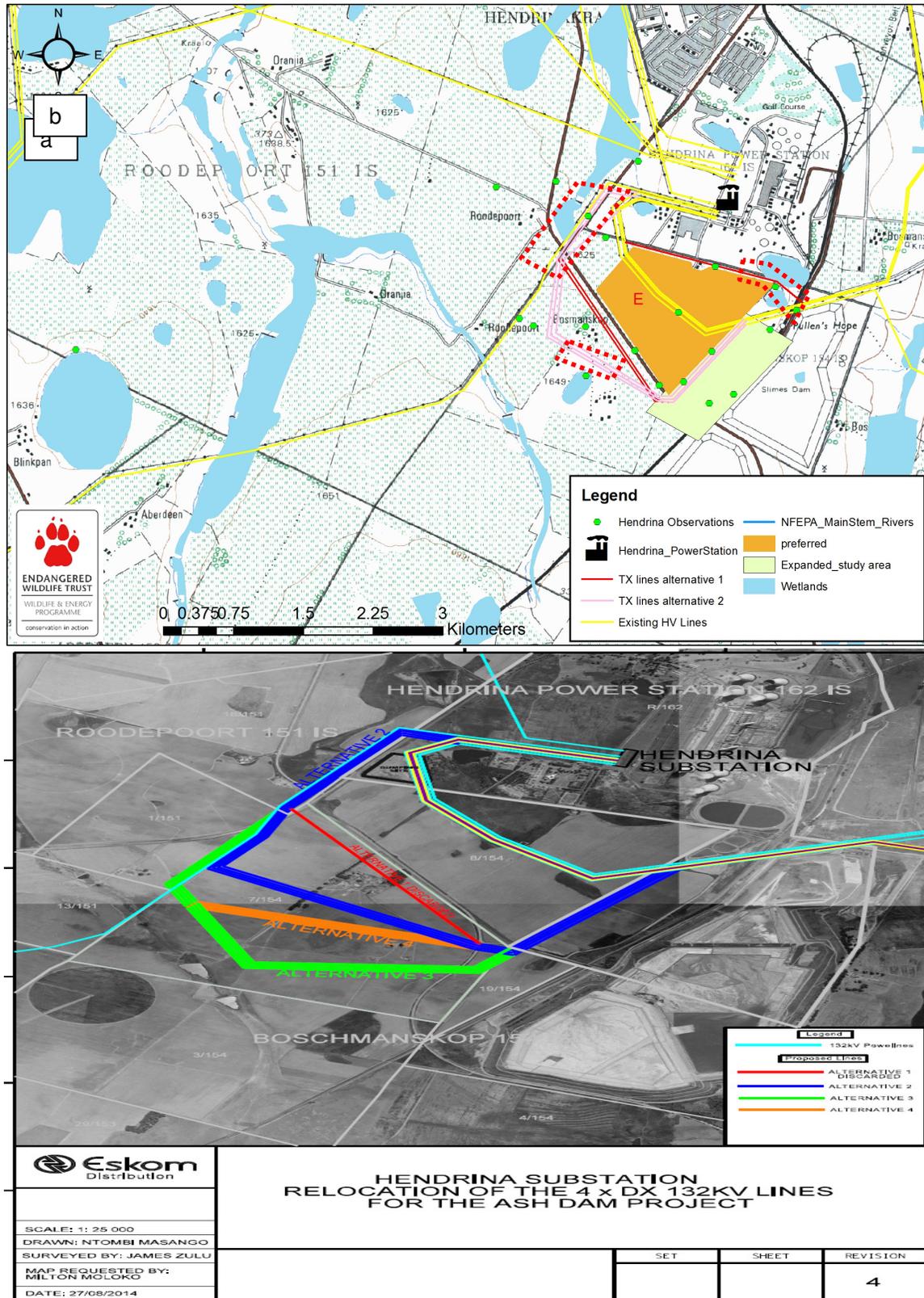


Figure 4.1: Map showing the ash disposal facility site, expanded study area, existing HV electrical infrastructure, wetlands, site visit observation points as well as sensitive zones

(see red dotted polygons through which overhead power-line sections may require collision mitigation (a), proposed power-line deviation alternatives (b).

4.15 Heritage

Element	Management Plan
Potential Impacts	Heritage objects or artefacts found on site and inappropriately managed.
Controls	<ul style="list-style-type: none"> All relevant legislation regarding the conservation of national heritage sites must be adhered to. Under no circumstances must the contractor, his employees, his sub-contractor's employee's remove, destroy or interfere with archaeological artefacts.
Maintenance	Awareness of procedures for dealing with heritage objects must be updated where necessary.
Corrective Action	<ul style="list-style-type: none"> In the event that any heritage sites are found within the footprint of the ash disposal facility all work will cease immediately, and the event reported to the South African Heritage Resources Agency (SAHRA) immediately. In the event that any heritage sites are found the site must be examined by an archaeologist as soon as possible. The ECO will advise the Contractor of necessary actions to be taken after receiving advice from the archaeologist. All necessary actions to ensure that delays to construction are minimised must be taken. If any human remains are discovered all work will cease immediately, the remains must be treated with respect and SAHRA notified immediately. An archaeologist/palaeontologist must be contracted to remove the remains at the expense of the developer.

4.16 Air Pollution Management

4.16.1 Air Quality

Element	Management Plan
Sources	<ul style="list-style-type: none"> Fuel burning engines Fire
Controls	<ul style="list-style-type: none"> All activities on-site must comply with the requirements of the National Environmental Management: Air Quality Act (Act 39 of 2004). Burning of materials including wood, grass and refuse which emit visible smoke will not be permitted on construction sites. Waste must be disposed, as soon as possible at a municipal transfer station, skip or on a permitted landfill site. Waste must not be allowed to stand on site to decay, resulting in malodours and attracting vermin. No open fires are to be allowed on site.
Maintenance	<ul style="list-style-type: none"> The Contractor will ensure that all vehicles and machinery are fitted with appropriate emission control equipment, are maintained frequently and serviced to the manufacturers' specifications.
Corrective Actions	<ul style="list-style-type: none"> If monitoring results or complaints indicate inadequate compliance with the EMPr, the source of the problem must be identified and existing

Element	Management Plan
	<p>procedures or equipment modified to ensure that the problem is rectified.</p> <ul style="list-style-type: none"> Non-compliance with the EMPr must be reported to the department, in writing, within 24 hours of an incident.

4.16.2 Dust Control

Element	Management Plan
Potential Impacts	PM ₁₀ concentrations and dust fallout
Sources	<ul style="list-style-type: none"> Land clearing activities such as dozing and scraping of vegetation and topsoil Excavation, grading / scraping and transport of material Loading and unloading of trucks Re-entrainment of deposited dust by vehicle movement Wind Erosion from stockpiles and unsealed roads and surfaces Wind erosion from exposed areas at ash disposal facility
Controls	<ul style="list-style-type: none"> Speed limits must be enforced in all areas, including public roads and private property to limit the levels of dust pollution Dust must be suppressed on access roads and on the ash disposal facility during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that will not result in the generation of run-off. Dust dispersion from construction activities, unsurfaced roads, spoil dumps and other construction locations will be limited and suppressed to the maximum extent practical. Spoil dumps must be positioned such that they are not vulnerable to wind erosion. Spoil and other dust-generating dumps which are left unused for 28 days or longer will be sprayed with water or chemically inert stabilisers to control dust, and treated with mulch and seeded. An appropriate freeboard will be maintained in trucks hauling dirt, sand, soil and other loose material when leaving the road reserve.
Maintenance	<ul style="list-style-type: none"> Any cleared areas must be watered to ensure that dust levels are minimised prior to sealing or re-vegetation
Corrective Actions	<ul style="list-style-type: none"> In the event of serious levels of dust pollution, the implementation of constant dust monitoring by qualified consultants must be undertaken If monitoring results or complaints indicate inadequate compliance with the EMP, the source of the problem must be identified and existing procedures modified to ensure that the problem is rectified
Specific Specialist Input	<ul style="list-style-type: none"> Water spays at area to be cleared Moist topsoil will reduce the potential for dust generation when tipped onto stockpiles Ensure travel distance and speeds between clearing area and topsoil piles to be at a minimum Ensure exposed areas remain moist through regular water spraying Dust fallout bucket to be placed to the east and to the west of the ash

Element	Management Plan
	disposal facility with monthly dust fallout rates not exceeding 1200 mg/m ² /day

4.17 Water Management

4.17.1 Water for Domestic Use

The Contractor will implement measures to ensure that the construction workforce present on the site has access to sufficient potable water.

Element	Management Plan
Controls	<ul style="list-style-type: none"> The provision of potable water and safe drinking utensils at various points on the site. Provision of facilities for hand washing at all ablution facilities and near all toilet facilities. Contractors must ensure construction crews are provided with an appropriate potable water supply, safe and healthy sanitary facilities and protection against exposure to environmentally dangerous or unhealthy situations or conditions.

4.17.2 Water Consumption

Element	Management Plan
Controls	<ul style="list-style-type: none"> The contractor must create awareness and encourage the construction workforce to use water sparingly such that there is no water wastage. The contractor must ensure that no natural water sources (i.e. streams, rivers) are used for construction activities or for domestic purposes by the construction workforce. The contractor will not make use of/collect water from any other source than those pointed out to them as suitable for use.

4.17.3 Water Pollution Management

Element	Management Plan
Controls	<ul style="list-style-type: none"> The contractor must ensure that working areas where hazardous substances (such as vehicle fuels) are handled or stored are designed to collect and contain these hazardous substances. The contractor must ensure that no pollution enters surface water or has the potential to pollute groundwater by ensuring that there is containment of spillages (e.g. diesel, oils, etc) and that there is an emergency plan in place to deal with accidental spillage. It is expected that the contractor has at least 100 bags of zorb (or other suitable product) in storage at all time so that it can be taken to spillages immediately The contractor must ensure that washing of containers, equipment,

	<p>vehicles and other surfaces only occurs at designated washing areas (use to be made of existing Eskom facilities).</p> <ul style="list-style-type: none"> • The contractor must ensure that all fuel, chemical, oil, etc spills are confined to areas where the drainage of water can be controlled and managed to confine spillages such that they do not interfere with stormwater and groundwater (referred to as 'clean water'). This can be achieved through the use of appropriate structures and methods such as the construction of bunded areas, berms and pans, or through the application of surface treatments that neutralise toxic effects. • All runoff water from fuel deposits, workshops, vehicles washing areas and other equipment must be collected and directed through oil traps to settlement ponds. These ponds must be suitably lined and should be cleaned as soon as practicable, and the sludge disposed of at a suitable waste site; • No wastewater or water containing any chemical or pollutant should be released from, or escape as effluent, from the site; • All ponding water from ash disposal facility drains into the existing lined pollution control dam. No potentially contaminated water, or water in contact with the ash shall be released into the wetland areas or natural veldt.
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4.17.4 Water Flows Across Construction Sites

Element	Management Plan
Controls	<ul style="list-style-type: none"> • The contractor must ensure that adequate measures are put into place to control surface water flows across and around the ash disposal facility site. • The quantity of uncontaminated stormwater entering cleared areas will be minimised by appropriate site design and by installation of control structures and drains which direct such flows away from cleared areas and slopes to stable (vegetated) areas or effective treatment installations. • Site drainage lines will be identified and control measures installed to handle predicted stormwater and sediment loads generated in the mini catchment. • The monitoring of potential impacts of spills etc. should be included in Eskom's existing ground water monitoring programme.

4.17.5 Aquatic Ecology – Specific Specialist Input

Element	Management Plan
General Recommendations	<ul style="list-style-type: none"> • It is recommended that construction activities should make use of "seasonal construction window" (March to September). • Minimize both the area that will be exposed and the exposure time during construction (LRRB, Mn/DOT and FHWA, 2003). • Pollution prevention, minimisation of impacts, water reuse and

	<p>reclamation, water treatment and discharge activities should be according to the DWA Best Practice Guidelines (DWA- H series, 2007).</p> <ul style="list-style-type: none"> • Storm water management, water and salt balancing, water monitoring and water treatment plans should, be consistent with DWA best practice guidelines (DWA- G-series, 2006) • Pollution control dams should be in line with DWA Best Practice Guidelines (DWA- A series, 2007). • Discharge into surface water systems, for whatever reason and withstanding water quality restraints, should consider the hydrological capacity and seasonality of associated watercourses. Maximum hydrological capacity of systems should not be exceeded. It is also pertinent that base flows (both high and low) should not be altered by discharge activity. This will result in a change in bed load capacity of the system and will ultimately result in system instability. • Erosion control measures should be implemented as the primary means of sediment control throughout the construction and operational phase. Increased turbidity and sedimentation resulting from erosion have several adverse effects on the aquatic environment. According to DWAF (2008) an increase in sediment input into the system due to erosion is a serious issue. • Surface water systems should be protected from contamination with volatile hydrocarbons and lubricants at all times. • Contingency plans need to be established in case of fuel or hazardous waste spills, storm water run-off and flood events. • No dumping of any building rubble, soil, litter, organic matter or chemical substances may occur within the associated wetland. Dumping and temporary storage of the above should only occur at predetermined locations. • All excavated material should be deposited and stabilised in an approved area
Ash disposal facility Site	<ul style="list-style-type: none"> • Construction activities need to comply with any condition set forth by applicable authorities. • It is preferable that an impermeable liner be placed at the base of the ash disposal facility during construction. This will assist in mitigating the spread of pollutants/toxic substances. • Clean water run-off channels must be constructed to divert clean water from above the construction site and divert the water around the work area (Clemens, 2010). This will be an important feature with regards to Wetland 1 (downstream of Alternative E) as it will help prevent run-off from becoming sediment-laden and entering receiving wetlands. • Vegetation clearing needs to be limited to the construction limits as it will assist in limiting erosion and reducing the velocity of run-off. In addition, clearing should only take place immediately before construction activities commence. Vegetative cover is the most effective measure to stabilise top soil and to prevent erosion, sedimentation and associated water quality impacts.

	<ul style="list-style-type: none"> Wetlands connected to affected HGM units in the primary study area will require monitoring during the construction phase. The results of the monitoring should feed into an adaptive management system. Specific emphasis should be placed on retaining wetland function PES
Power Lines	<ul style="list-style-type: none"> The placement and construction of the transmission line pylons should be avoided in wetlands. Clearing of vegetation needs to be limited to the construction limits. All excavated material during the construction of the pylons, should be deposited and stabilised in distinct piles within approved areas with suitable erosion control measures in place in order to minimise and reduce erosion and siltation. In the event of any damage to the surrounding wetlands during the construction of the transmission lines, the advice of a suitable and qualified specialist will be required in order to facilitate suitable rehabilitation of the wetland in question
Pipelines	<ul style="list-style-type: none"> The construction of the pipeline servitude should not infringe on the wetland areas. Surface and storm water must be diverted away from excavation. Water accumulated with the trenches (rainfall events etc.) needs to be pumped out through a water bypass system in order to filter out sediment
Off-site Mitigation	<p>All reasonable and responsible actions have been considered to avoid impacts on wetland imposed by the proposed development. It thus follows, that the only mitigation for residual loss of wetland functions associated with the proposed development will be off-site mitigation. In light of the PES and EIS of HGM units identified in the primary study area and the environmental least cost associated with Alternative E, off-site mitigation is a feasible management action. It must however be noted that off-site mitigation is not an alternative/substitute to on-site mitigation measures and that it will not reduce the magnitude and severity of the impacts associated with the proposed ash disposal facility construction. Off-site mitigation should be implemented in combination with the above mention mitigation measures. The impaired state of receiving wetlands in the secondary study area and the hectare equivalents provided in this report provide an opportunity and base for off-site mitigation. An additional wetland study will be required to provide a comprehensive off-site mitigation plan</p>

4.18 Soil Management

4.18.1 Topsoil

Element	Management Plan
Controls	<ul style="list-style-type: none"> • Topsoil¹ will be sourced from areas which are cleared for construction, conserved and used judiciously in the rehabilitation of disturbed land. • The Contractor is required to strip topsoil together with grass from all areas where permanent or temporary structures are located, construction related activities occur, and access roads are to be constructed. Topsoil must be stockpiled for later use. • Topsoil is to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify. • Topsoil must not be compacted in any way, nor should any object be placed or stockpiled upon it. No vehicles may be allowed access onto the stockpiles after they have been placed • Land to which topsoil has been applied will be vegetated as soon as possible after application. • Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds.
Maintenance	<ul style="list-style-type: none"> • As far as possible, stored topsoil will be free of deleterious matter such as large roots, stones, refuse, stiff or heavy clay and noxious weeds which would adversely affect its suitability for planting. • Topsoil stockpiles are expected to be similar to the existing Hendrina stockpiles. Topsoil, which is to be stockpiled for periods exceeding 28 days, must be treated with mulch, roughened and seeded with an approved grass mixture or ground cover specified by the ECO. The mulch cover must be kept free of alien vegetation/seeds.

4.18.2 Spoil Material

Element	Management Plan
Controls	<ul style="list-style-type: none"> • The location of spoil stockpile sites will be agreed by the ECO prior to the onset of any operations that will generate spoil materials. The Contractor will ensure that the material does not blow or wash away. • Spoil dumps will be located well away from natural drainage lines. All waste material must be stored in accordance with the station's waste management procedures • Spoil dumps will be placed wherever practical in topographically sheltered locations to obtain maximum protection from wind exposure. • Spoil dumps will have slopes not greater than 1:2 (vertical to horizontal). Less steep slopes will be applied in conditions where erosion risks are indicated to be high. • Spoil dumps will be smoothed and contoured and compacted to prevent ponding.

¹ Topsoil is defined as the top layer of soil that can be mechanically removed to a depth of about 100mm without ripping or blasting.

4.18.3 **Excavation, Backfilling and Trenching**

Element	Management Plan
Controls	<ul style="list-style-type: none"> • Excavations should preferably not be undertaken until such time that all required materials/services etc. are available on-site, to facilitate immediate laying of such services or the construction of subsurface infrastructure. • Excavations must not result in dewatering. • Any such excavations must be undertaken within the confines of an established construction site - i.e. a site that is either protected with a peripheral fence, or a site that has a regular/continual human presence. Failing this, regular daily inspections are essential. All excavations, regardless of depth, must be provided with escape ramps, suitably constructed with a stable gravel or similar material, at a minimum gradient of 1:2. • Consider using any excess rocks and boulders that were excavated from the construction site for any erosion protection work which is required on site. • Excess material as a result of excavation activities is not to be dumped along the roadsides, but must, together with construction rubble be removed, once construction is completed, and appropriately disposed of. • Suitable excavated material is to be stockpiled next to excavations for use as backfill and all unsuitable or excess material must be loaded onto trucks and hauled to designated spoil areas. • Backfill material must be from excavated material or imported from a suitable source if the excavated material does not conform to the required specifications • Areas to be backfilled must be cleared of all unsuitable material and debris

4.18.4 **Erosion Control**

Element	Management Plan
Controls	<ul style="list-style-type: none"> • Areas susceptible to erosion must be protected by installing the necessary temporary and/or permanent drainage works as soon as possible. • Any erosion channels developed during the construction period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored to a proper condition. • Anti-erosion compounds shall consist of an organic or inorganic material to bind soil particles together and shall be a proven product able to suppress dust and erosion. The application rate shall conform to the manufacturer's recommendations. The material used shall be of such quality that grass seeds may germinate and not prohibit growth. • These erosion control measures, including stormwater drainage

Element	Management Plan
	<p>systems, will be installed before construction commences.</p> <ul style="list-style-type: none"> • Installed erosion control measures will be appropriate to site conditions to handle a one-in-two-year storm event for temporary structures, and a one-in-fifty year storm event for permanent structures which provide ongoing sediment control after a site has been rehabilitated. • Contingency plans will be in place for extreme storm events. • Blocking of stormwater drainage systems must be prevented and storm water must be managed to prevent soil erosion. • Natural stormwater run-off, which is not polluted by the site operations, must be diverted from the ash disposal facility site. • All cleared areas will be promptly rehabilitated and in accordance with specific instructions from the Site Manager. • Soil must be exposed for the minimum time possible once cleared of invasive vegetation. The timing of clearing and grubbing must be co-ordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion.

4.19 Waste Management

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> • Inefficient use of resources resulting in excessive waste generation • Litter or contamination of the site or water through poor waste management practices.
Sources	<ul style="list-style-type: none"> • Packaging • Construction wastes • Waste dirt or rock from excavation • Storage of oils and fuels • Domestic waste from construction camp
Controls	<ul style="list-style-type: none"> • Waste Management on site is to be in accordance with Eskom's existing waste management procedures. • Where possible, construction wastes on site must be reused or recycled • Disposal of waste must be in accordance with relevant legislative requirements. • The Contractor must familiarise themselves with the definitions of waste and the handling, storage and transport of it as prescribed in the applicable environmental legislation. • The contractor will appoint a person to manage and control waste. • Integrated waste management on site will be carried out by applying, in order of preference, waste avoidance, reuse, recycling and disposal. • Burning of waste material will not be permitted. • The Contractor will provide and maintain adequate facilities for litter collection (e.g. bins) at strategic locations around the site camp. • Waste will be sorted at source (i.e. the separation of tins, glass, paper etc). Recycled waste of this sort will be collected by a local contractor. • A high quality of housekeeping will be maintained on all construction

Element	Management Plan
	<p>sites to ensure that materials are not left where they can be washed or blown away to become litter.</p> <ul style="list-style-type: none"> • Littering must be prohibited. • All waste (general and hazardous) generated during the construction phase may only be disposed of at appropriately licensed sites in terms of applicable Environmental legislation • Illegal dumping must be prohibited.
Maintenance	<ul style="list-style-type: none"> • Litter collection at all construction sites will be undertaken at least once per working day. Work teams will be supplied with refuse bags which can be disposed of daily in skips at centralised locations. • All waste containers will be emptied at least once a week. • Waste documentation must be completed and kept onsite.
Corrective actions	<ul style="list-style-type: none"> • A complaints register must be maintained, in which any complaints from the community must be logged. All complaints must be investigated and, if appropriate, acted upon • Corrective actions are required to be undertaken immediately after a complaint is made or a non-conformance is identified.
	<ul style="list-style-type: none"> •

4.20 Storage and Handling of Hazardous Substances

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> • Release of contaminated water from contact with spilt chemicals • Fuel source for on-site fires • Generation of contaminated wastes from used chemical containers.
Controls	<ul style="list-style-type: none"> • The contractor must store, handle and dispose all hazardous substances (including oils, fuels, chemicals, etc.) in a manner prescribed in the substance Material Safety Datasheet (MSDS) supplied by the manufacturer and in the relevant Hazardous Substance Act (1973) and Regulations. • The relevant Material Safety Data Sheets (MSDS) must be available on site for each chemical/substance. • Ensure that spill kits are available on site to clean up spills and leaks. The contractor shall have to keep at least 100 bags of zorb (or other suitable product) in storage at all times. • Ensure that only designated areas are used for the handling or storage of hazardous materials. • All hazardous materials must be stored at one location, to be approved by the ECO. • Storage of all hazardous materials is to be safe, tamper proof and under strict control. • Fuels, solvent and other wastes must be stored in vessels equipped with secondary containment structures and must be removed from the construction area for disposal in compliance with relevant legislation and regulations. • The containers in which hazardous substances are kept must, in

Element	Management Plan
	<p>compliance with hazardous material management procedures, be removed from the site once empty.</p> <ul style="list-style-type: none"> • Hazardous products must be stored on adequately bunded surfaces in the designated hazardous material storage areas. • All manufactured and/or imported hazardous materials must be stored in an appropriate manner in the Construction camp. Depending of the type of material, storage areas will be roofed with impervious material (e.g. cement and chemicals). • Hazardous fluids must not be stored together with hazardous solids; instead fuels, lubricants, transmission and hydraulic fluids must be stored in a designated area for fluids. • All hazardous material storage areas must be sited away from ecologically sensitive areas. • Hazardous chemicals used during construction must be stored in containers. The relevant Material Safety Data Sheets (MSDS) must be available on site. • The Contractor must provide adequate and approved facilities for the storage and recycling of used oil and contaminated hydrocarbons. Such facilities must be designed and situated with the intention of preventing pollution of the surrounding area and environment. • The contractor must identify and maintain a register of all activities that involve the handling of potentially hazardous substances, as well as devise and supervise the implementation of protocols for the handling of these substances. This will include all fuels, oils, lubricants and grease. • The contractor must ensure that all hazardous substances are handled in accordance with the manufacturer's specifications and legal requirements.
Maintenance	<ul style="list-style-type: none"> • Any accidental chemical/fuel spills to be corrected immediately. • Keep MSDS records of chemicals in use up to date. • Waste records must be kept available for review • Implement appropriate actions and measures to reduce, stop or contain a spill of potentially hazardous substances (e.g. fuel or lubricating oil). • Implement appropriate actions and measures to reduce or prevent contamination of the ground and surface water as a result of a spill of potentially hazardous substances
Corrective Actions	<ul style="list-style-type: none"> • The contractor must ensure the observation and supervision of chemical storage and handling practises and vehicle maintenance throughout the construction phase. • The contractor must arrange and supervise the implementation of clean-up operations and appropriate disposal of contaminated materials at the hazardous waste disposal site. • A complaints register must be maintained, in which any complaints from the community must be logged. All complaints must be investigated and, if appropriate, acted upon • Keep written records detailing the type of spill, the corrective and remedial measures implemented in the stopping or reduction of the

Element	Management Plan
	<p>spill, and the clean up of the spill. Such progress reporting is important for monitoring and auditing purposes and the written reports may afterwards be used for training purposes in an effort to prevent similar future occurrences.</p> <ul style="list-style-type: none"> • Report the nature and extent of the spill to the ECO, and RE as soon as reasonably possible, but within 24 hours. • The ECO will prescribe measures to be implemented in order to prevent spills of potentially hazardous substances.

4.20.1 **Cement and Concrete**

Element	Management Plan
Controls	<ul style="list-style-type: none"> • Concrete must be mixed only in an area demarcated for this purpose. All concrete spilled outside this area, must be promptly removed by the Contractor and taken to a permitted waste disposal site. After all concrete mixing is complete all waste concrete must be removed from the batching area and disposed of at an approved waste disposal site. • Waste concrete and cement sludge must be scraped off the site of the batching plant daily and removed to an approved landfill site. (To prevent pollution during the rain). • Solidified concrete can be disposed of at a registered general waste landfill site. • Concrete must not be mixed directly on the ground. Plastic liners or mixing trays are to be used.

4.20.2 **Fuel storage**

Element	Management Plan
Controls	<ul style="list-style-type: none"> • All legal compliance requirements with respect to Fuel storage and dispensing must be met. • All fuel storage tanks (temporary or permanent) and associated facilities must be designed and installed in accordance with the relevant oil industry standards, SANS codes and other relevant requirements. • The Contractor must ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times. • Areas for storage of fuels and other flammable materials must comply with standard fire safety regulations and may require the approval of the Municipal Fire Prevention Officer. • Symbolic safety signs depicting "No Smoking", "No Naked Flames" and "Danger" are to be prominently displayed in and around the fuel storage area. • The capacity of the fuel storage tanks must be clearly displayed and the product contained within the tank clearly identified.

Element	Management Plan
	<ul style="list-style-type: none"> • There must be adequate fire- fighting equipment at the fuel storage and dispensing area or areas. • Tanks must be situated in a bunded area, the volume of which must be at least 110% of the proposed volume of the tank. • The floor of the bunded area must be smooth and impermeable, constructed of concrete or plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The floor of the bunded area will be sloped towards an oil trap or sump to enable any spilled fuel and/or fuel –soaked water to be removed. • Any water that collects in the bund must not be allowed to stand and must be removed and the hydrocarbon digestion agent within must be replenished. • Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks must be sealed and stored on an area where the ground has been protected. • Any electrical or petrol-driven pump must be equipped and positioned so as not to cause any danger of ignition of the product. • All waste fuel and chemical impregnated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site. • The amounts of fuel and chemicals stored on site will be minimised. • Storage sites will be provided with bunds to contain any spilled liquids and materials.
Maintenance	<ul style="list-style-type: none"> • Regular inspections will be carried out to detect leaks and spillages. All storage facilities will be maintained as regularly as is necessary to ensure they meet the original specification. Inspections will be carried out on a daily, weekly and monthly basis by the ECO. • All equipment that leak oil or fuel must be repaired immediately or removed from the construction site
Corrective Actions	<ul style="list-style-type: none"> • Absorbent material must be available at tanks to absorb any spills

4.21 Traffic and Transport

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> • Traffic, and thus accident potential, increase at the proposed access point • Traffic, and thus accident potential, increase on neighbouring roads
Controls	<ul style="list-style-type: none"> • Optimal use must be made of existing access roads. The construction of new access roads must be minimised. • A responsible person must be given the duty of monitoring the traffic and to see that the correct and sufficient warning signs are in place. • Creation of designated access to the proposed site to ensure safe entry and exit. • Transport of all hazardous substances must be in accordance with the relevant legislation and regulations. • All drivers will be in possession of an appropriate valid driver's license. • All maintenance vehicles travelling on public roads will adhere to the

Element	Management Plan
	<p>specified speed limits.</p> <ul style="list-style-type: none"> • Moderate speeds (i.e. as per Eskom's speed limits) will be employed and adhered to on all access/service roads. • The movement of all vehicles will be controlled such that they remain on designated routes. • No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances. • No deviation from approved access roads will be allowed. If necessary, new access routes can be designed, but must initially be approved by the ECO. • Traffic control mechanisms must be implemented to limit vehicle entrained dust from unpaved roads.
Maintenance	<ul style="list-style-type: none"> • Appropriate maintenance of all vehicles • Appropriate maintenance of access roads
Corrective Actions	<ul style="list-style-type: none"> • Visual monitoring of dust produced by traffic in order to minimise dust emissions • Visual monitoring of traffic control measures to ensure they are effective • A complaints register must be maintained, in which any complaints from the community must be logged. All complaints must be investigated and, if appropriate, acted upon.

4.22 Site Clean -up

Element	Management Plan
Controls	<ul style="list-style-type: none"> • The contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project. • The contractor must fully rehabilitate (e.g. clear and clean area, rake, pack branches etc) all disturbed areas and protect them from erosion. • Only indigenous plants that adapted to the local conditions must be considered for rehabilitation purposes. • Before final decisions about the choice of plant species are taken the ECO must be approached for their advice

5 OPERATION AND MAINTENANCE

The operation activities will be included in the power station's EMS, however, the following elements are covered in this EMPr.

5.1 Labour

5.1.1 Conduct of Employees

The following restrictions or constraints will be placed on the operation and maintenance staff in general:

- No indiscriminate disposal of rubbish or rubble.
- No littering of the servitude and substation areas and the surrounding areas.
- No collection of firewood.
- No interference with any fauna or flora.
- No use of facilities other than ablution facilities provided.
- All Eskom safety, health and environmental procedures will be complied with.

5.2 Hazard and Risk

Element	Management Plan
Actions/Controls	<ul style="list-style-type: none"> • When construction is complete, the Risk Management and Emergency Response Procedures at the power station must be updated to include the new ash disposal facility. • Safety training. • On-site and off-site emergency plans • Monitoring • Incident and safety reporting • Community consultation and information
Maintenance	<ul style="list-style-type: none"> • Regular checks and drills must be conducted to ensure that the risk and hazard control strategies are maintained up to date.
Monitoring	<ul style="list-style-type: none"> • All monitoring will occur according to the risk management and emergency response procedures. • A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.
Corrective Actions/Reporting	<ul style="list-style-type: none"> • If an emergency report or emergency drill indicates an error/omission in risk and hazard management procedures, then procedures must be altered or updated to ensure effective management. • If an incident occurs, then emergency procedures must be enacted to ensure all impacts are minimized.

5.3 Noise

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> Nuisance noise from the operations activities
Sources	<ul style="list-style-type: none"> Staff transport and equipment transport Operation and Maintenance activities
Actions/Controls	<ul style="list-style-type: none"> In order to reduce the overall noise emission to acceptable levels, final design of equipment will ensure the level of noise emission from the plant must be limited to levels guaranteed by the manufacturer. All noise from activities during operation and maintenance must be within acceptable limits (according to the Environment Conservation Act and the National Environmental Management Act), taking into consideration that maintenance activities may be required outside of working hours, for example, in the case of emergencies. Eskom will provide all equipment with standard silencers and maintain silencer units on vehicles and equipment in good working order, for those vehicles where it is necessary. Noise mitigation strategies that are in compliance with SANS code 10103 must be implemented.
Maintenance	<ul style="list-style-type: none"> All plant and equipment, including vehicles, must be properly maintained in order to minimise noise generation.
Monitoring	<ul style="list-style-type: none"> Observation of on-site noise levels by ECO A complaints register must be held, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.
Corrective Actions/Reporting	<ul style="list-style-type: none"> Corrective action is required to be undertaken immediately after a complaint is made or non-conformance is identified. Any complaints regarding noise must be investigated, sources identified and mitigation measures implemented. Feedback on resolution of the issue must be provided to the complainant. The ECO will maintain an incident reporting system to record non-conformances. The Eskom Environmental Officer will report on compliance with this EMPr if required by the administering authority.

5.4 Fauna and Flora

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> Impact of operational activities on flora and fauna in the surrounding areas.
Sources	<ul style="list-style-type: none"> Movement of employee and visitor vehicles within and around the site
Actions/Controls	<ul style="list-style-type: none"> Use of indigenous plants in landscaping and rehabilitation activities Schedule regular alien plant identification and eradication activities. No staff may harm or kill any fauna during operation or maintenance activities. Wildlife interaction will be investigated by the Environmental Officer. The active control of all alien invasive species as per Eskom's existing

Element	Management Plan
	procedures
Maintenance	<ul style="list-style-type: none"> Maintenance of rehabilitated areas to ensure sustainability.
Monitoring	<ul style="list-style-type: none"> Observation of site appearance by Eskom Environmental Staff A complaint register, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon. Regular alien plant inspections (6 – 12 monthly)
Corrective Actions/Reporting	<ul style="list-style-type: none"> An incident reporting system will record and manage follow up of resolution of non-conformances. In the event of an incident, the Environmental Officer will write a report regarding the incident, and make recommendations. A follow up site inspection will be conducted by the Environmental Officer in order to assess the effectiveness of the recommendations.

5.4.1 Use of herbicides in the Alien Control Programme

The use of herbicides will be in compliance with the terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947). In terms of this Act, a registered pest control operator will apply herbicides, or will supervise the application of herbicides.

Therefore, Eskom will:

- Ensure that a registered pest control operator applies or supervises the application of all herbicides.
- Ensure that all herbicides are stored in a well-ventilated demarcated storage area.
- Ensure that a register of all contents of the storage area is kept and updated on a regular basis.
- Ensure that a register of usage (e.g. daily) of all relevant details of herbicide usage is kept, and that such a register is maintained by the relevant Eskom custodian.

5.5 Avifauna

- **Ash disposal facility**

Impact	Mitigation
Operational Phase	
Leachate contamination of surrounding water sources	Ensuring that the Operational Management Plan incorporates guidelines as to how best to minimize this impact. Eskom must implement it's existing Environmental procedures accordingly.

- **Transmission Lines**

Impact	Mitigation
Operational Phase	
Collision	Mark the relevant sections of line (i.e. those within the sensitivity zones, as depicted in figure 16 below) with appropriate marking devices.
Electrocution	All new pylon structures should make use of a "bird friendly" monopole structure, fitted with a bird perch, as per Eskom standard guidelines.
Nesting of birds on Tower structures and disturbance during routine maintenance.	No nests may be removed, without first consulting the EWT's Wildlife and Energy Program (WEP). During maintenance, if any of the "Focal Species" identified in this report are observed to be roosting and/or breeding in the vicinity, the EWT is to be contacted for further instruction.

5.6 Air Pollution Management

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> PM₁₀ concentrations and dust fallout
Sources	<ul style="list-style-type: none"> Use of Dirt roads Wind blown dust from the ash disposal facility
Actions/Controls	<ul style="list-style-type: none"> Dust control mechanisms that must be utilised include the following: <ul style="list-style-type: none"> any open areas must be vegetated and watered and if necessary mulched to protect surfaces from drying out, all roads on-site must be sealed or watered as per the Eskom's existing procedures Maintain speed limits Maintain all vehicles and equipment in good working order.
Specific Specialist Input	<ul style="list-style-type: none"> Ensure water sprays at and around the ash disposal facility Dust fallout bucket to be placed to the west and to the southeast (dominant wind direction) of the ash disposal facility with monthly dust fallout rates not exceeding 1200 mg/m²/day^(a)
Maintenance	<ul style="list-style-type: none"> All equipment must be maintained according to industry standards. This will ensure that emissions, odours and dust levels continue to fall within guideline levels. Roads must be sealed and maintained to ensure that dust from road or vehicle sources will not exceed prescribed levels. During establishment of vegetation from rehabilitation/landscaping affected areas must be watered to ensure dust levels are minimized Ensure incident and complaint registers are established and maintained.
Monitoring	<ul style="list-style-type: none"> Monitoring must be undertaken to ensure emissions are not exceeding the legal limits. A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate acted upon.
Corrective	<ul style="list-style-type: none"> If monitoring results or complaints indicate inadequate performance,

Element	Management Plan
Actions/Reporting	<p>then the source of the problem must be identified, and existing procedures or equipment modified to ensure the problem is rectified.</p> <ul style="list-style-type: none"> The Environmental Office is to keep an environmental incident reporting system to record non-conformances.

5.7 Water Management

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> Wastewater entering the surrounding areas / system
Sources	<ul style="list-style-type: none"> Stormwater Seepage Water Management of potentially contaminated stormwater run-off
Controls/actions	<ul style="list-style-type: none"> Potentially contaminated water must be directed to the pollution control / seepage / ash water return dams. Any run-off that is discharged from the site must be uncontaminated or the relevant valid discharge water use licence as per section 21(f) of the National Water Act (1998) must be obtained. Spills of potential contaminants must be immediately cleaned up and neutralised. Such spills must be handled with consideration to health and safety considerations. The use of water to clean up spills must be avoided except where absolutely necessary. Movement of vehicles on and off site is to be through approved access points only. Spill kits must be made available on site for the clean up of spills and leaks of contaminants. Spill response procedures to include removal/disposal of potentially contaminated water and any used absorbent materials.
Maintenance	<ul style="list-style-type: none"> The surface and ground water quality control structures used on site must be monitored and maintained in a fully operational state at all times. Ensure incident/complaint registers are established and maintained.
Monitoring	<ul style="list-style-type: none"> Monitoring program used should be an extension of the existing monitoring program at Eskom.
Specific Specialist Input - Monitoring	<p>The results the aquatic ecology specialist report provide a platform for future monitoring. It is recommended that constituents of the report (see Appendix B) be incorporated into a monitoring plan with quarterly intervals during construction and biannually during the operational phase of the proposed development. It is pertinent for monitoring sites and methodology to be consistent as this provides credibility and continuity in information.</p>

Element	Management Plan
	<p>Results of each monitoring report should be incorporated with that of past assessments. Particular emphasis must be placed on spatial and temporal variation in community structures as well as the absence and presence of indicator species. In the case of invertebrates and fish, seasonal average of abundances, species richness and feeding group ratios should be provided along with a standard deviation. It is always a good idea to include raw data in the form of an appendix. A record of seasonal variation in biological responses will also aid in highlighting other drivers of ecological change (i.e. mining or discharge activity), and it will help to measure the rate of recovery in the system after an unforeseen spill event. From this, target thresholds for aquatic communities may be generated, which in turn will act as a measurable environmental performance indicator.</p> <p>Changes measured in biological metrics must justify an immediate correction in the process inducing the change. Biomonitoring reports should inform an adaptive management process, which ideally, should address relevant components of the process as soon as possible (prior to the following biomonitoring assessment). After a number of monitoring surveys (approximately four), a template for expected community structures may be extrapolated from the data. From this, key species or ratios between species may be highlighted which, in turn, will act as a standard in itself. These key species and or ratios between species may be used for comparison and interpretation</p>
<p>Corrective Actions/reporting</p>	<ul style="list-style-type: none"> • Corrective action is required to be undertaken immediately when a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the effected environment as much as practically possible and taking preventative measures. • An incident reporting system will record significant events and issues with the sediment and water quality controls. • In the event of a major spill or leak of contaminants, the administering authority must be contacted immediately as per incident reporting procedures. • In the event that water quality at the monitoring locations is found to fall outside of the prescribed guideline levels, the source of the deviation must be investigated and measures taken to correct the problem. • Should any negative effects become apparent these must immediately be reported to the relevant authority.

5.8 Maintenance of Rehabilitated areas

Element	Management Plan
Controls	<ul style="list-style-type: none"> Monitoring of plant growth in rehabilitated areas will be conducted on a weekly basis during initial phases and on a monthly basis when plants have become firmly established. Vegetation must be replanted in areas where vegetation cover has decreased due to dieback, or has failed otherwise to successfully establish. Noxious weeds and invasive and alien species will be controlled by pulling, cutting or any other means approved by the Site Manager. Bare patches will be replanted.

5.9 Waste management

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> Ineffective use of resources resulting in excessive waste generation Litter or contamination of the site or water through poor waste management practices
Actions/Controls	<ul style="list-style-type: none"> Ensure compliance with Eskom's existing Waste Management Procedures. Ensure that care is taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation. General Waste <ul style="list-style-type: none"> * Recycled where possible or disposed of properly to landfill as designated by the administering authority Hazardous Waste <ul style="list-style-type: none"> * Separate hazardous and general waste and dispose hazardous waste to an appropriate hazardous waste disposal site.
Maintenance	<ul style="list-style-type: none"> Uncontaminated waste must be removed at least weekly for disposal Contaminated or regular wastes must be disposed of as necessary and in accordance with legislation An incident/complaint register must be established and maintained
Monitoring	<ul style="list-style-type: none"> Visual inspection of the site must be carried out daily for evidence of litter or waste material that has been inappropriately disposed of by site personnel Waste collection must be monitored on a regular basis Waste documentation must be completed and available for inspection on request A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.
Corrective Actions/Reporting	<ul style="list-style-type: none"> Corrective action is required to be undertaken immediately after a complaint is made or non-conformance is identified.

Element	Management Plan
	<ul style="list-style-type: none"> Upon the identification of any non-conformance, appropriately feasible remediation measures must be determined and implemented. An incident reporting system will record and manage follow up of resolution of non-conformances

5.10 Storage, Handling and Management of Hazardous Substances

Element	Management Plan
Potential Impacts	<ul style="list-style-type: none"> Release of contaminated water from contact with spills Generation of contaminated wastes from used chemical containers and spill clean up
Actions/Controls	<ul style="list-style-type: none"> Management strategies/operational procedures for the routine monitoring and inspection of pipelines and other infrastructure will be compiled and implemented. The storage of flammable and combustible liquids such as oils will comply with the relevant legislation. Any spills will be rendered harmless and arrangements made for appropriate collection and disposal, including cleaning materials, absorbents and contaminated solid in accordance with this EMPr Ensure that spill kits are available on site to clean up spills and leaks. Obtain any permits and approvals necessary and comply with the conditions attached to such permits and approvals Store all hazardous substances in a manner prescribed in the relevant Acts and Regulations (e.g. in a well-ventilated area). Implement appropriate actions and measures to reduce, stop or contain a spill of potentially hazardous substances. Implement appropriate actions and measures to reduce or prevent contamination of the ground and surface water as a result of a spill of potentially hazardous substances. Arrange and supervise the implementation of clean up operations and proper disposal of contaminated materials at a licensed hazardous waste disposal site. Keep written records detailing the type of spill, the corrective and remedial measures implemented in the stopping or reduction of the spill, and the clean up of the spill. Such progress reporting is important for monitoring and auditing purposes and the written reports may afterwards be used for training purposes in an effort to prevent similar future occurrences. All fuel tanks to be designed and constructed in accordance with a recognised code (international standard). Internationally approved non-corrosive pipework systems must be installed (approved codes).
Maintenance	<ul style="list-style-type: none"> Spill and emergency response equipment must be accessible.

Element	Management Plan
	<ul style="list-style-type: none"> Storage facilities and dams must be maintained to ensure design capacity is available.
Monitoring	<ul style="list-style-type: none"> Observation and supervision of the ash disposal facility, seepage and ash water return dams and associated pipelines by Site Manager throughout the operational phase Inspection of bunding integrity, stability and function A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.
Corrective Actions/Reporting	<ul style="list-style-type: none"> Corrective action is required to be undertaken immediately after a complaint is made or non-conformance is identified An incident reporting system will record and manage follow up of non-conformances.

5.11 Traffic and transport

Element	Management Plan
Controls	<ul style="list-style-type: none"> All drivers will be in possession of an appropriate valid driver's license. All operation and maintenance vehicles travelling on public roads will adhere to the specified speed limits. All existing assigned speeds will be employed and adhered to on all roads within the mine area. The movement of all vehicles will be controlled such that they remain on designated routes. No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances. No deviation from approved access roads or transportation routes will be allowed.

5.12 Rehabilitation Requirements as set out in the Ash disposal facility Operational Plan

5.12.1 General

The *Contractor* shall be required to adhere to any applicable South African Environmental legislation during the operation and management of the ash disposal facility. The responsibility shall remain with the *Contractor* to keep up to date with any applicable revisions or new environmental legislation that come into effect, during the contract period. In addition the *Contractor* shall also comply with Eskom specific Policies, Procedures and Guidelines. Copies of the relevant Eskom documents can be obtained from the *Project Manager*.

5.12.2 Water Quality

Eskom will monitor water quality of surrounding streams and groundwater. The *Contractor* shall be responsible for upkeep of solution trenches, stormwater channels, ash water return (AWR) dams and other such structures to ensure that they remain effective in maintaining a zero effluent discharge system. The *Contractor* shall keep in mind that the ash system forms a part of the entire Power Station water balance. All failures on the ash disposal facility with regard to dams, drains etc. must be reported to the *Project Manager* and the Hendrina environmental department. An assessment of the effect of the failure in terms of water quality and water balance must be determined between the *Project Manager* and the *Contractor*.

5.12.3 Air Quality

- **Wind Pollution (Due to Ash Blow Off)**

During the building of the ash disposal facility the *Contractor* is to ensure that ash dust pollution is kept to a standard which is in accordance with the current South African legislation, as well as any Eskom policies that may be applicable. In general, windblown-dust shall be continuously controlled by the *Contractor* by regular moisture conditioning of the ash or by rehabilitating the exposed ash surfaces. The exposed section of the side slope of the ash disposal facility is normally only rehabilitated after the next step- and vehicle access above the slope has been constructed.. The *Contractor* is also responsible for dust control on this surface and may use any effective method, which is acceptable to the *Project Manager*, to control dust blow-off from this area. Acceptable methods are surface wetting, chemical stabilization or protection with shade cloth.

- **Wind Pollution Due to Construction Works**

The constructional plant access routes, haul, roads etc. are to be watered sufficiently to prevent any dust blow off during the entire contract period.

Note:

Should there be a suspicion that the air quality is in excess of the standard, then the *Project Manager* may arrange for the installation of dust monitors to verify the situation.

5.12.4 Waste Management

Toxic waste or any waste other than coal discard shall not be permitted to be mixed with the ash. No building rubble or other scrap is to be dumped on the ash disposal facility. Office waste shall be removed from site. The *Contractor* may contract with the current waste disposal contractor for Hendrina power station for a similar service. Cut vegetation may be used as compost for rehabilitation of the side slopes.

The ash disposal facility shall at all times be completely fenced off and have the appropriate warning signs displayed. The *Contractor* shall be responsible for the maintenance of the fence. Mixing of coal discards with fine ash (i.e. co-disposal) is not permitted.

5.12.5 Land Management

- **Veld Fires**

Any veld fires during the first two growing seasons after rehabilitation can be disastrous. The *Contractor* shall take all the steps necessary to control fires and a veld fire management plan shall be submitted timeously to the *Project Manager* for approval. The existing fire breaks are to be maintained to prevent any spread of veld fires from the ash disposal facility area.

- **Erosion Control**

The *Contractor* shall be responsible for the protection of all areas subject to erosion by providing any necessary drainage works, temporary or permanent and by taking all other reasonable precautions as may be necessary to prevent scouring of banks, ash slopes and other areas. Any erosion damage occurring during the operation of the facility shall be thoroughly repaired and the areas restored to their original condition. Such repair work shall be carried out as soon as possible after damage was caused with all eroded topsoil reclaimed from drains and other areas where possible.

6 DE-COMMISSIONING

6.1 General Principles for Environmental Management during Decommissioning

At this point of the project planning process, the necessity for and timing of the decommissioning of the new ash disposal facility is not known. It is assumed that decommissioning will commence once the Life of the Power Station has been reached. Decommissioning will be undertaken as required by the Power Station's closure objectives. These objectives may be required to be re-visited and supplemented closer to closure. In order to minimise the extent of rehabilitation activities required during the decommissioning phase, Eskom will ensure that constant effort is applied to rehabilitation activities throughout the life of the Power Station

6.2 Rehabilitation Requirements as set out in the Ash disposal facility Operational Plan

6.2.1 General

This section comprises the proposed landscaping and revegetation procedures for the ash disposal facility. The *Contractor* shall, in accordance with the requirements of this document be responsible for the:

- Gradual stripping and stockpiling of topsoil
- Gradual shaping of side slopes and top of the ash disposal facility
- Gradual spreading of topsoil to cover shaped ash disposal facility side slopes and top surface
- Planting of grass for erosion control on prepared slopes
- Establishment of veld grass on the prepared areas
- Establishment of indigenous trees and shrubs.
- Aftercare of rehabilitated areas to ensure continued stability and eventual self sustainability
- The upkeep of a complete rehabilitation progress manual

- **Pollution Control**

The *Contractor* shall take all reasonable measures to minimize dust, mud on nearby roads and walkways and inconvenience to the public or others because of the construction activities.

- **Progress Manual**

The *Contractor* shall start and keep a progress manual fully documenting the progress made and significant factors influencing the rehabilitation process. The manual must be made available upon the *Project Manager's* request.

6.2.2 Materials

Whether the quality of material is specified or not, the *Contractor* shall at all times use material of the best possible quality and shall price his tender accordingly.

- **Plants**

Plants shall be true to name, healthy and well rooted. Plants shall have a good form typical of their type unless specifically specified otherwise. Containerized plants shall not be root bound. Plants shall grow well and be free from scars or damage, insect pests, diseases or parasites.

Each plant shall be handled, packed and transported in the accepted industry manner for that species or variety and all the necessary precautions shall be taken to ensure that the plants will arrive at the site in a condition for successful growth.

During delivery to the site, plants shall be adequately protected from damage by sun, wind or other causes. Containers shall be in good condition and the soil shall be free from weeds. Containerized plants not planted out immediately shall be stored and maintained in nursery like conditions i.e. including storage under shade cloth, well watered and inspected for routine maintenance until they are planted out.

The *Contractor* shall be prepared to find plants anywhere in the country. Only if the *Project Manager* is convinced beyond doubt that the plants specified cannot be obtained, will substitutes be considered. Substitutes will be decided on by the *Project Manager*, the *Contractor* will be informed in writing. The *Contractor* shall assure himself of the availability of specified plants before tendering.

- **Tree Stakes**

Tree stakes shall, unless otherwise specified, be treated poles (round droppers) complying with SABS 457, 35 mm minimum diameter and 2 400 mm long. These shall be used of both single and multiple staking. Creosoted timber will not be accepted.

- **Tree Ties**

Tree ties for fixing trees to stakes shall be of plastic, rubber or other similar material which supports the tree in a substantial manner, and shall be approved by the *Project Manager*. Ties shall be such to minimize abrasion and to allow for sufficient space around the tree trunk to permit growth.

6.2.3 Equipment

The *Contractor* shall provide sufficient plant and equipment of adequate capacity, suitable for the work and site conditions, to fulfil his obligations in terms of the operation. In all cases the most suitable equipment for the particular application shall be used in the interests of time saving and efficiency.

6.2.4 Preliminary Works

The rehabilitation of the ash disposal facility and other ashed areas to be rehabilitated shall take place in phases. Work shall commence as soon as an area becomes available for rehabilitation. The *Contractor* is to program accordingly.

- **Topsoil Stripping**

Topsoil shall be stripped and stockpiled for future use from those areas to be ashed on. The process shall be gradual and in accordance with the ashing program. The depth of stripping is to vary according to the soil formation. The *Contractor* shall, in general, strip soils down to the hydromorphic horizon. Soil from the hydromorphic horizons (such as soil with a high clay percentage and/or wet soils) shall not be acceptable for use as topsoil. Only topsoil with up to but not exceeding 30% of coarse particles and stone shall be acceptable.

The stone or coarse particles shall also not exceed 250 mm in diameter. Where stripping takes place from areas which will not be ashed upon in the future the areas shall be contoured after stripping as to blend in smoothly with the existing levels. The areas shall be left without any slacks or hollows where water can accumulate. Unless it is used immediately, the topsoil shall be stored in positions as indicated or approved by the *Project Manager*, in the following manner:

- Store the soil in heaps of maximum height 1500 mm
- Establish veld grass, or other vegetation as instructed, on heaps to be left for periods in excess of three months
- Take any further preventative steps necessary to protect the heaps from erosion.

The *Contractor* shall manage his rehabilitation programme in such a manner that stripped topsoil is reused as soon as possible for rehabilitation purposes.

- **Preparation For Planting**

- a) Slopes not Exceeding 1:10**

This includes the top of the ash disposal facility.

i) Topsoil Spreading.

Spread topsoil evenly to a minimum thickness of 200 mm over the total graded area.

ii) Shaping

Work the topsoil in to a minimum depth of 200 mm ensuring a smooth final surface without any slacks and hollows where ponding can take place.

iii) Fertilizers

Apply fertilizers evenly at the following rates:

- 250 kg/ha 4:3:4 (30)+Zn
- 300 kg/ha Superphosphate (10,5% P)

Application shall be carried out not more than 1 week prior to planting. The mixing of inorganic fertilizers and seed shall not be acceptable.

b) Slopes in excess of 1:10 (10 %)

i) Grading of Side Wall Steps

Edge of side slope steps to be graded to create an even slope with a rough surface. Ash clods shall not exceed 350 mm in diameter.

ii) Sodding

For erosion control purposes slopes exceeding 5 metres in length shall be stabilised by planting 450 mm wide *Cynodon* spp. sod strips. The strips shall be spaced 5 m apart measuring from the toe of the slope in each case. Sods shall be secured in place using pegs or any other approved method.

iii) Topsoil Spreading

Topsoil shall be spread evenly to a minimum thickness of 300 mm over the total graded area.

iv) Veldgrass

Rough veld grass stalks shall be spread over topsoil to a depth of 40-60 mm.

v) Shaping

The slope shall be evenly smoothed ensuring that all signs of terracing are removed and that the ash, topsoil and veld grass are thoroughly mixed. Ash clods exceeding 100 mm in diameter may protrude through the topsoil layer.

vi) Fertilizers

Apply fertilizers evenly at the following rates:

- 250 kg/ha 4:3:4 (30)+Zn
- 300 kg/ha Superphosphate (10,5% P)

Application shall be carried out not more than 1 week prior to planting. The mixing of inorganic fertilizers and seed shall not be acceptable.

6.2.5 Planting Procedure

- **Tree Planting**

To avoid erosion problems, trees shall not be planted on slopes in excess of 1:3. The trees shall be planted in groups of 3-5 plants ensuring a minimum coverage 50 plants/ha. Certain trees are sensitive to the direction of a slope and the planting plan shall take this into account. The following plant species shall be used:

- *Vachellia karoo* (Sweet Thorn) - Plant on east and west slopes
- *Diospyros* (Blue Bush) - Plant on north lycoides slope
- *Rhuspyroides* (Common Wild Currant) – Plant on any slope
- *Ziziphus* (Buffalo Thorn) - Plant on north mucronata slope
- *Rhus lancea* (Karee) - Plant on east and west slopes

- **Scarifying**

The total area to be seeded or planted shall be scarified to a minimum depth of 20 mm. Scarification shall be done horizontally across slopes. Seeding shall take place directly following scarifying. In the event of the scarified surface becoming smooth again before seeding, the *Contractor* shall re-scarify to ensure a suitable seed bed.

- **Seeding**

Seeding shall take place as early as possible during the growing season. The *Contractor* is expected to programme accordingly. The seed mixture to be used shall be made up as follows unless agreed differently with the *Project Manager*.

- **Grass Species**

	kg/ha
<i>Chloris gayana</i>	2
<i>Eragrostis tef</i>	3
<i>Eragrostis curvula</i>	3
<i>Eragrostis chloromelas</i>	1
<i>Eragrostis lehmanniana</i>	1
<i>Enneapogon cenchroides</i>	2
<i>Aragrostis echonochloidea</i>	1
<i>Themeda triandra</i>	1
<i>Digitaria eriantha</i>	2
<i>Cynodon dactylon</i>	2
<i>Hypperrhenia hirta</i>	1
<i>Panicum maximum</i>	1
Total	20 kg/ha

Where specific grass seed cannot be obtained by the *Contractor*, he may replace it with another species in consultation and agreement with the *Project Manager*. No seeded sections shall be taken over prior to a successful germination rate of at least 70% (measured as 70% of the total area and/or 70% of any particular seeded area of at least 2 500m²) can be proven by the *Contractor*. In addition, there shall be no bare patches in excess of 500 mm in diameter or half a meter squared in area. Germination shall be regarded as successful when the grass sward is 5 mm above ground level and identifiable as of the types sown.

6.2.6 Care After Planting

The operator shall protect newly seeded/planted areas against undue traffic and/or other disturbances throughout the contract and maintenance periods.

6.2.7 Maintenance

The *Contractor* shall adequately maintain construction areas for a period of 6 months. Maintenance shall include:

- Continual repair of damage caused by erosion or any other cause. Erosion gullies exceeding 100 mm in width may be repaired by placing *Cynodon* spp sods or clumps in the gullies that have begun to form so as to effectively stop them from developing.
- Maintenance of acceptable grass cover with reseeding/sodding as necessary.
- The *Contractor* shall be required to apply a top dressing of 150 kg/ha ammonium sulphate to seeded areas 4 to 6 weeks after germination under favourable growing conditions. (If in doubt the *Contractor* should discuss this aspect with the *Project Manager*).

6.2.8 Measurement

- ***Stripping and Stockpiling of Topsoil***

The unit of measurement will be per m³ and the rate shall cover all activities specified under Topsoil Stripping.

- ***Transport of Topsoil***

The first 1.5 km of transport between the stockpile or borrow pit and the final placement position shall be treated as freehaul. The next 0.5 km shall be treated as limited overhaul and the unit of measurement shall be per m³. The remainder of the haul distance shall be treated as long overhaul and the unit of measurement shall be perm³.km. The rate shall cover the loading, transporting and off-loading of the topsoil.

- ***Topsoiling***

The unit of measurement will be m² and the rate shall cover all activities listed under Preparation for Planting.

- ***Grassing***

The unit of measurement will be m² and the rate shall cover all activities listed under Scarifying, Seeding, Care after Planting and Maintenance.

- ***Planting Of Trees***

The unit of measurement will be per item and the rate shall cover all activities listed under clauses Tree Planting, Care after Planting and Maintenance.

Appendix A

“Focal Species” identified in the Avifauna Report

The resultant list of ‘target/focal species’ for this study is as follows:

- Greater Flamingo
- Lesser Flamingo
- Grey-crowned Crane
- Denham’s Bustard
- Blue Korhaan
- Southern Bald Ibis
- White Stork
- Black Stork
- White-bellied Korhaan

Appendix B

Constituents for Future Aquatic Ecology Monitoring

The spatial orientation of the proposed Ash disposal facility (primary study area) and a 500 m radius (secondary study area) is shown in **Figure 1**, represented in South African quarter degree map (1:50 000) 2629BA, 1996. The baseline field survey was undertaken during July 2011 with a follow up and update of the assessment during the latter part of 2014 and these composed of two separate components:

1. Assessment of biomonitoring sites ascertain the present sensitivity of biological receptors in the receiving environment and describe baseline ecological conditions in these areas. The location of biomonitoring sites in relation to Alternative E is shown in **Figure 2**. **Table 1** provides the coordinates of biomonitoring sites assessed.
2. The assessment and delineation of identified wetlands on the primary and secondary study areas as shown in Error! Reference source not found..

Table 1: Coordinates of sites HA1 and 2, July 2011.

GPS Point	Position	Y	X
HA1	North of Alternative E	-26.0296	29.58752
HA2	North west of Alternative E	-26.0331	29.58105

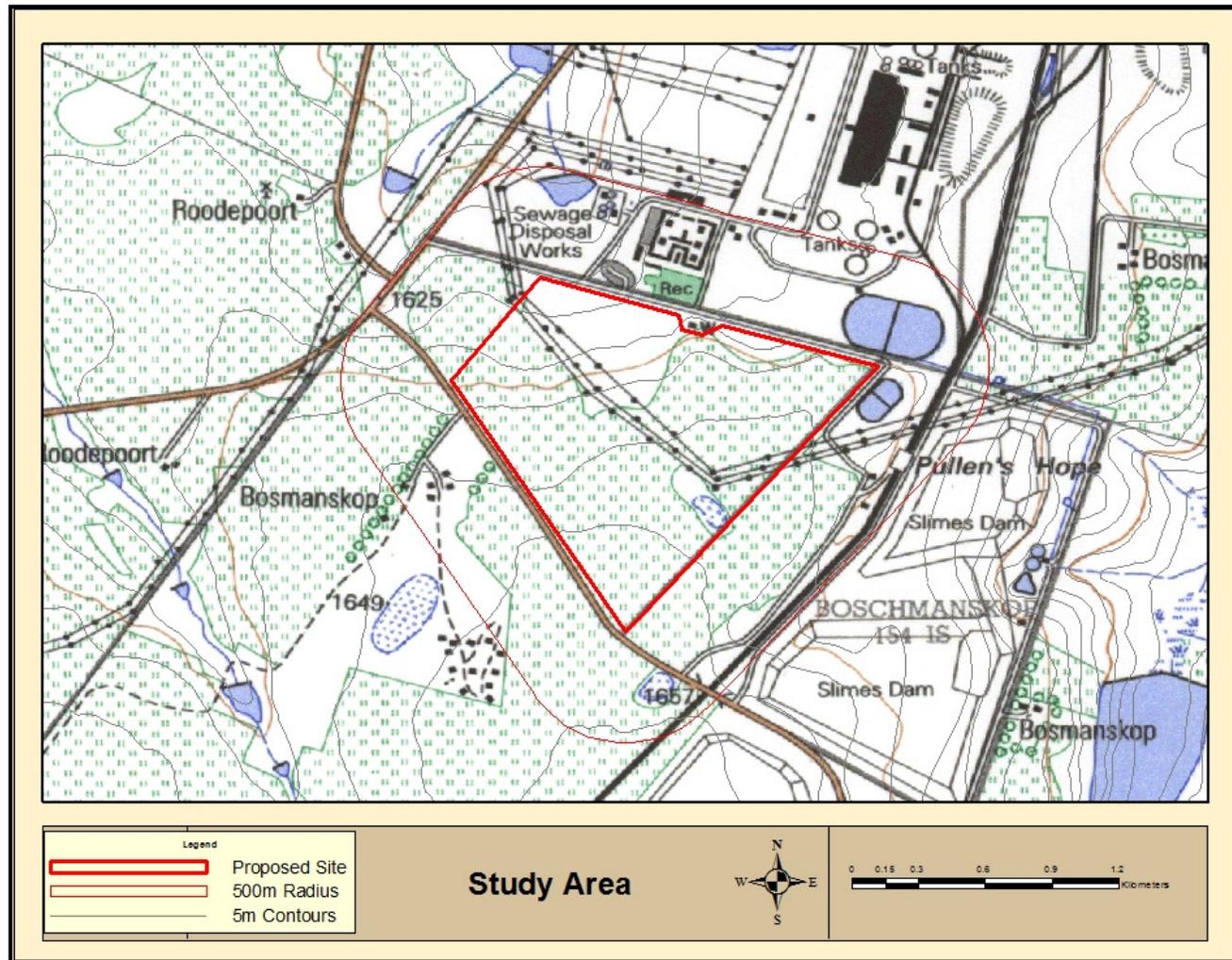


Figure 1: Map showing the study area on South African quarter degree map (1:50 000) 2629BA, 1996.

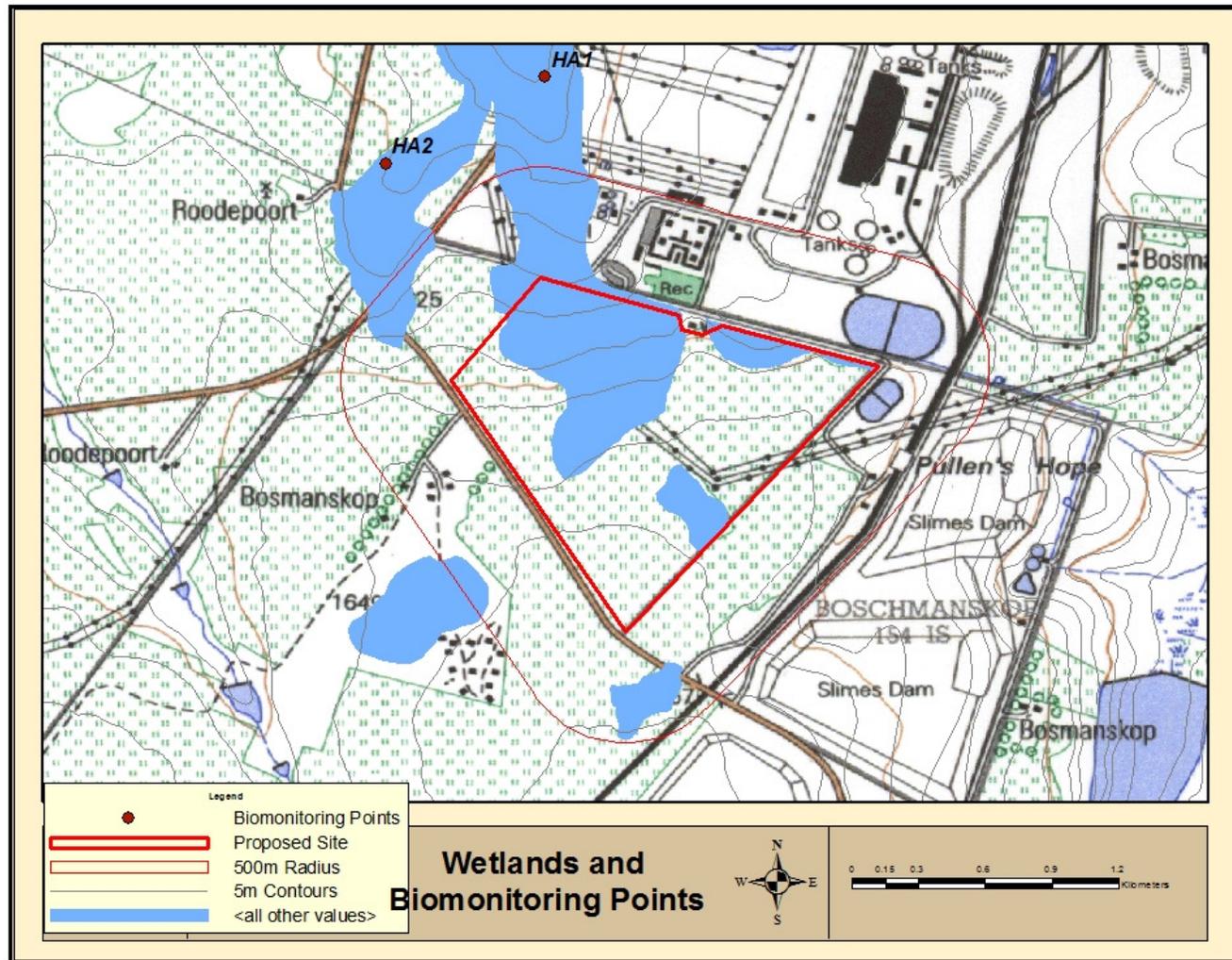


Figure 2: Map showing wetlands and aquatic biomonitors assessed, associated with the study area.

Water Quality

The *in situ* physico-chemical variables that were measured during the aquatic surveys are shown in **Table 2**. *In situ* analysis was undertaken using a pre-calibrated Eutech PCD650 multi-parameter hand-held water quality meter.

Table 2: *In situ* parameters measured at sites during the September 2011.

<i>In situ</i> parameters	Abbreviation	Units
pH	pH	[H ¹⁺ ions]
Temperature	Temp	°C
Electrical Conductivity	EC	mS·m ⁻¹
TDS	TDS	ppm
Dissolved Oxygen	DO	mg/l
Dissolved Oxygen	DO%	%

Data Analysis

The results obtained from the assessment of the water quality data were compared to benchmark criteria compiled by Kotze (2002) consisting of Target Water Quality Range's (TWQR) for aquatic ecosystems (DWAf, 1996) and raw water quality guidelines for Rand Water (Steynberg *et al.*, 1996 and Rand Water, 1998) (**Table 3**).

Table 3: Water quality ranges as compiled by Kotze (2002) and provided in mg/l. References 1: Steynberg *et al.* (1996); 2: DWAf (1996); 3: Rand Water (1998).

Variables	Unit	Scores				Reference
		5	3	1	0	
		Ideal	Acceptable	Tolerable	Unacceptable	
pH	[H ¹⁺ ions]	6.5-8.5		5-6.5/8.5-9	<5/>9	1,3
Conductivity	mS·m ⁻¹	<45	45-70	>70-100	>100	1
Dissolved oxygen	mg/l	>9	>5-9	4 to 5	<4	3

Aquatic invertebrate and Fish Habitat Assessment

Only section one of IHAS was employed during the course of this project. Section one focuses on sampling biotopes and assesses the quantity and quality of the stones-in-current, vegetation and other biotopes (includes stones-out-of-current, gravel, sand and mud). The quality of each biotope, in terms of potential habitat for invertebrates, is assessed and expressed as a score. The scores for each biotope are then summed to give a total Habitat Score (**Table 4**).

Table 4: Invertebrate Habitat Assessment Score ratings and categories (McMillan, 1998).

IHAS score %	Description	Category
>80 %	Habitat is considered to be more than adequate and able to support a diverse invertebrate fauna	Good
<80>70 %	Habitat is considered to be adequate and able to support invertebrate fauna	Adequate
<70 %	Habitat is considered to be limited and unable to support adverse invertebrate fauna	Poor

The fish habitat assessment refers to the assessment of fish habitat that provides suitable conditions for a particular fish species to inhabit (Kleynhans, 2007). The assessment is site specific, and takes into consideration the diversity of velocity-depth classes, and the occurrence of various cover types at each velocity-depth class (**Table 5**).

Table 5: Fish habitat assessment where scores are rated as follows: 0 = none; 1= rare; 2= sparse; 3= common; 4= abundant; 5= very abundant (Kleynhans, 2007)

Slow Deep	Slow Shallow	Fast Deep	Fast Shallow
Overhanging vegetation	Overhanging vegetation	Overhanging vegetation	Overhanging vegetation
Undercut banks & root wads			
Substrate	Substrate	Substrate	Substrate
Aquatic macrophytes	Aquatic macrophytes	Aquatic macrophytes	Aquatic macrophytes
Water column	Water column	Water column	Water column

Diatom Assessment

Diatoms are microscopic, unicellular algae that are used as indicators of water quality as they respond rapidly to specific physico-chemical conditions. A response by the diatom community to changes in water quality is reflected in the community structure, which can be used to infer ecological water quality conditions over a period of time. Diatom field methodology was carried out according to the methodology described by Taylor *et al.* (2005). Van Dam ecological scores for trophic status and Percentage of Pollution Tolerant Valves (%PTV) were also applied in this study (**Table 6**).

Table 6: Diatom indices implemented in the Hendrina Wet Ash Disposal facility assessment.

Diatom Index	Abbreviation
Percentage Pollution Tolerant Valves (Kelly & Whitton, 1995)	%PTV
Van Dam Ecological Scores for pH (Van Dam, 1994)	-

Diatom laboratory procedures were carried out according to the methodology described by Taylor *et al.* (2005). For the purposes of this study 400 diatom frustules were counted for ecological analysis (Prygiel *et al.*, 2002). Suggested rules for counting diatoms according to CEN (2004) were followed. The taxonomic guide by Taylor *et al.* (2007) was consulted for identification purposes in this study. Where necessary, Krammer & Lange-Bertalot (1986; 1988; 1991a & 1991b) were used for identification and for confirmation of species identification.

Macroinvertebrate Sampling

Aquatic macroinvertebrates were collected using the sampling protocol of the South African Scoring System version 5 or SASS 5 (Dickens & Graham, 2002). The protocol is divided between three biotopes, namely Vegetation (VEG), Stones-In-Current (SIC) and Gravel-Sand-Mud (GSM). Samples are collected in an invertebrate net with a pore size of 1000 microns on a 30cm x 30cm frame by kick sampling of SIC and GSM, and sweeping of VEG for a standardised time or area. Macroinvertebrates were identified to family level in the field according to the SASS 5 protocol and using relative reference guides (Dickens & Graham, 2002; Gerber & Gabriel, 2002).

According to the SASS5 protocol (Dickens and Graham, 2002), SASS5 methodology should only be carried out in wadeable rivers and stream. Due to the nature of the sites assessed, the SASS5 methodology could not be implemented. Subsequent SASS5 results should be interpreted with caution. In the context of this assessment a relative measure of ecological intactness between monitoring sites and between monitoring intervals may be inferred. No ecological classification was done based on the invertebrate response metric as this was deemed inappropriate. Similarly the invertebrate habitat assessment does not provide an ecological category and does not provide a measure for anthropogenic disturbances. It simply provides a measure to gauge available invertebrate habitat and provides a platform for comparison between monitoring sites.

Fish Assessment

Fish survey methodology was undertaken according to Kleynhans (2007). Fish were sampled at respective sites by means of electro-narcosis (electro-shocking). Each segment was subjected to no less than 60 minutes of electro-shocking. Notes were made of velocity depth classes sampled and conclusions were made within these flow limitations.

Wet Health

A *WET-Health* assessment was undertaken to ascertain the PES (**Table 7**) of the wetland systems located within a 500m boundary of the proposed new Ash Disposal Facility, according to the methodology set out by Macfarlane *et al.* (2009). Wetland health is defined as “a measure of the similarity of a wetland to a natural of reference condition” (Macfarlane *et al.*, 2009).

The WET-Health index considers the state of the 3 main functional aspects of the wetland units, namely hydrology, geomorphology and vegetation. A Level 1 assessment was carried out for Wetlands 1, 3 and 4 respectively, with a Level 2 assessment carried out at Wetlands 2, 5 and 6 respectively. Briefly discussed below:

- **Level 1 assessment**: primarily a desktop level evaluation with limited field verification.
- **Level 2 assessment**: encompasses structured data collection with regards to the wetland and its catchment.

Table 7: Health categories used by WET-Health for describing the hydrological integrity of wetlands (Adapted from Macfarlane *et al.*, 2009).

Description	Impact Score Range	PES Category
No discernible modifications or the modifications are of such a nature that they have no impact on the hydrological integrity.	0-0.9	A
Although identifiable, the impacts of the modifications on the hydrological integrity are small.	1-1.9	B
The impact of the modifications on the hydrological integrity is clearly identifiable, but limited.	2-3.9	C
The impact of the modifications is clearly detrimental to the hydrological integrity. Approximately 50% of the hydrological integrity has been lost.	4-5.9	D
Modifications clearly have an adverse effect on the hydrological integrity. 51% to 79% of the hydrological integrity has been lost.	6-7.9	E
Modifications are so great that the hydrological functioning has been drastically altered. 80% or more of the hydrological integrity has been lost.	8 - 10	F

Ecological Importance and Sensitivity

Ecological Importance and Sensitivity scores were calculated using the RDM (Kleynhans, 1999) methods. Information from the baseline biodiversity assessment, *WET health* and *WET EcoServices* were taken into account when populating the EIS scores. Scoring guidelines are shown in **Table 8**, and categories are noted in **Table 9**.

Table 8: Scoring guidelines for each attribute considered in determining the EIS (Kleynhans, 1999).

EIS Score	
Very high	4
High	3
Moderate	2
Marginal/low	1
None	0
Confidence Score	
<i>Very high confidence</i>	4
<i>High confidence</i>	3
<i>Moderate confidence</i>	2
<i>Marginal/low confidence</i>	1

Table 9: Ecological Importance and Sensitivity categories and the interpretation of scores for biota and habitat determinants (Kleynhans, 1999).

Ecological Importance and Sensitivity categories	Range of Median
<p><u>Very high</u> Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.</p>	>3 and ≤ 4
<p><u>High</u> Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.</p>	>2 and ≤3
<p><u>Moderate</u> Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.</p>	>1 and ≤2
<p><u>Low/marginal</u> Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.</p>	>0 and ≤1