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1. INTRODUCTION

Duvha Power Station is a coal fired power station located in Witbank, Mpumalanga Province. The Power Station has five power generating units with a combined capacity of 3,000MW. The power station is located east of Witbank Dam with the Ash Dam Complex at a minimum distance of 1.7 km from the Witbank Dam and the Low-level dam about 1.2 km see figure 1 for layout plan.
The approximate co-ordinates of the ash dam are as follows:

Latitude: 25°56'29.02" S

Longitude: 29°20'19.63" E

Figure 1: Ash dam facility

The Power Station produces a large amount of ash that gets disposed of in the ash dam. The rehabilitation of the ash dam facility may result in a significant impact, if not managed and maintained properly with a detrimental impact on South Africa's soil, water, and air. It is required that the ash dam stepped in areas and embankment walls be rehabilitated to prevent dust on stepped in areas.

2. SUPPORTING CLAUSES

2.1 SCOPE

2.1.1 Purpose

The purpose of the document is to define the scope of work for the rehabilitation of the Ash Dam Facility at Duvha power station.

2.1.2 Applicability

This document is applicable to Duvha Power Station only.

2.2 NORMATIVE / INFORMATIVE REFERENCES

2.2.1 Normative

[1] ISO 9001 Quality Management Systems - Requirements

[2] ISO14001 Environmental Management Systems – Requirements with Guidance for Use

[3] ISO 45001 Occupational Health and Safety Management Systems – Requirements with Guidance for Use

[4] Occupational Health and Safety Act

[5] National Environmental Management Act (Act No. 107 of 1998) as amended

[6] Electricity Act of 2006, as amended

[7] OHS Act; Act 85 of 93 Occupational Health and Safety Act; Act 85 of 93

[8] SANS 10286:1998 The deposition practice of all mine residue in South Africa

2.2.2 Informative

[9] ISO 9000 Quality management systems – Fundamentals and vocabulary

[10] ISO 9002 Quality management systems – Guidelines for the application of ISO

[11] ISO 28000 Supply Chain Security Management System Standard

[12] ISO 31000 Risk Management - Principles and guidelines

[13] ISO 9004 Quality Management System – Quality of an organisation - Guidance to achieve sustained success

[14] 32-1034 Eskom Procurement and Supply Chain Management Procedure

2.3 DEFINITIONS

2.3.1 Disclosure Classification

Controlled Disclosure: Controlled Disclosure to external parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
ISO	International Organisation of Standardisation
HIRA	Hazard Identification and Risk Assessment
OHS	Occupational Health and Safety
QCP	Quality Control Plan
NEMA	National Environmental Management Act
SANS	South African National Standards

2.5 ROLES AND RESPONSIBILITIES

Auxiliary engineering:

- Quality assurance by conducting quality control during maintenance activities.
- Ensure that the scope is executed accordingly, and all work is done as per specification.

Coal management department (CMD)

- Managing Operation and maintenance of the ash dam
- Ensure that the supplier executes all the work specified in the scope of work on the set timelines.

2.6 PROCESS FOR MONITORING

N/A

3. SCOPE OF WORK

3.1 DESCRIPTION OF THE WORKS

The scope entails rehabilitating the ash dam on the stepped in areas as well as embankment walls for dust suppression purposes.

3.2 SITE CHARACTERISTICS

Duvha Power Station is currently producing approximately 225 000 tons per month of ash. The total area of the ash dam complex is about 450ha. The final elevation is approximately 80m above the current height. The rate of rise of the ash dam complex is approximately 1.68m per year. The design life is approximately 47 years. The station has about 20 years until it closes and this about 34m of ash above the current level. The step in is executed every 8m of vertical height and the step-in width of each bench is 4m. All the ashed areas below the current level of ashing require rehabilitation as well as the stepped in areas. The last step in which was executed was more than the design step in due to the missed step in therefore rehabilitation on these areas will be more than the normal bench rehabilitation.

3.3 DETAILED SCOPE

The ash dam requires step ins when certain elevations are reached as per operation and maintenance manual. The stepped in areas produce lots of dust which poses a health issue. Dust suppression by water or chemical spraying is a short-term measure, however, a permanent solution is required for dust suppression. The Power Station uses rehabilitation which is defined as covering of the ash dams with fertile soil or topsoil and the planting of grass and trees as a permanent dust suppression method. A contractor is required to execute the rehabilitation activities on the ash dams.

3.3.1 Rehabilitation of embankment walls(vegetation)

This section comprises the proposed landscaping and re-vegetation procedures for the ash dam. The Contractor shall, in accordance with the requirements of this document:

- Draft a detailed method statement to execute the works based on the scope of work and send to the Employer for acceptance before the works can commence.
- Review relevant site information, that includes reports applicable.
- Provide a detailed Project program of the works from start to finish.

- Draft a detailed Quality Control Plan to the Employer for review and acceptance with intervention points.
- Notify the Employer about any upcoming intervention points at least 48 hours in advance.
- All proposed changes by the Contractor must be submitted to the Employer for review and approval.
- Utilize all relevant SANS standards and Eskom Procedures to plan and execute the works.
- Keep a record of all works in a daily diary to be signed off by the Project Coordinator.
- Plan the rehabilitation work accordingly to cater for the rainy days and seasons.
- Compile a safety file and attend safety induction at Duvha Power Station before executing any field work.
- Manage cost and a scheduled time frame of the overall project work.
- Ensure all works detailed in this scope are carried out in full.
- Provide regular feedback on the status of the works.
- Keep up to date with all applicable environmental standards.
- Comply with Eskom specific Policies, Procedures and Guidelines.
- Adhere to any applicable South African Environmental legislation i.e., NEMA, NEMWA and NWA.
- Comply with the Duvha Water Use License.

The following form part of the rehabilitation activities:

- Gradual stripping and stockpiling of topsoil
- Gradual shaping of side slopes and top of the ash dam
- Gradual spreading of topsoil to cover shaped ash dam 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.

3.3.2 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.

3.3.3 Tree stakes

Tree stakes shall, unless otherwise specified, be treated poles (round droppers) complying with SANS 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.

3.3.4 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 *employer*. Ties shall be such to minimize abrasion and to allow for sufficient space around the tree trunk to permit growth.

3.3.5 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 Contract.

In all cases the most suitable equipment for the application shall be used in the interests of time saving and efficiency.

3.3.6 Preliminary work

The rehabilitation of the ash dam shall take place in phases. Work shall commence as soon as an area becomes available for rehabilitation. Areas with recent step ins shall be prioritised as dust mainly from those areas. The Contractor is to programme accordingly.

3.3.7 Stripping of topsoil

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 and contours can accumulate.

Unless it is used immediately, the topsoil shall be stored in positions as indicated or approved by the *employer*, 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 more than 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 re-used as soon as possible for rehabilitation purposes.

3.3.8 Preparation for planting

Slopes not Exceeding 1:10.

This includes the top of the ash dam.

Topsoil Spreading.

Preparing for top-soiling – erosion gullies are to be backfilled with selected fill material and nominally compacted before topsoil is applied.

Spread topsoil evenly to a minimum thickness of 300 mm over the total graded area. Topsoil shall be scarified using hand-raking or light rotavators and all stones removed. Existing topsoil is to be manually loosened and prepared.

Shaping

Work the topsoil into a minimum depth of 300 mm ensuring a smooth final surface without any slacks and hollows where ponding can take place

Fertilizers

Application shall be carried out not more than 1 week before planting.

ERI shall without any additional compensation, have the topsoil stockpiled and soil on side slopes tested to determine the quantity and type of fertiliser which will be required for establishing proper growth conditions for the grass. The Project Manager shall be furnished with the test results. Only after approval by the Project Manager of the nature and quantity of the fertiliser, its application may be proceeded with.

or

Apply fertilizers evenly at the following rates:

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

The mixing of inorganic fertilisers and seed shall not be acceptable.

Slopes more than 1:10 (10 %)

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.

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.

Topsoil Spreading

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

Veld grass

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

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.

Fertilisers

Apply fertilisers 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 fertilisers and seed shall not be acceptable.

3.3.9 Planting procedure

3.3.9.1 Tree planting

To avoid erosion problems, trees shall not be planted on slopes more than 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:

Acacia karroo (Sweet Thorn) – Plant on east and west slopes

Diospyros lycoides (Blue Bush) – Plant on north slope

Rhus pyroides (Common Wild Currant) – Plant on any slope

Ziziphus mucronate (Buffalo Thorn) – Plant on north slope

Rhus lancea (Karree) – Plant on east and west slopes

3.3.9.2 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.

3.3.9.3 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:

Grass species	**Kg/ha**
Chloris gayana	2
Eragrostis tef	3
Eragrostis curvula	3
Aragrostis chloromelas	1
Aragrostis lehmanniana	1
Enneapogon cenchroides	2
Aragrostis echonochloidea	1
Themeda triandra	1
Digitaria eriantha	2
Cynodon dactylon	2
Hypperrhenia hirta	1
Panicum maximum	1
	20kg/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 Manage in consultation with environmental department. The change will be of the same monetary value.

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 seeded area of at least 2 500m2) can be proven by the Contractor. In addition, there shall be no bare patches more than 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.

3.3.10 Grass sods

Sods shall be of the variety of grass specified in the Site-specific Rehabilitation Plan. Grass sods shall be harvested, delivered, planted and watered within 36 hours unless otherwise authorised by the Project Manager. The grass sods shall be free from noxious weeds and diseases. Sods shall be in moist soil not less than 30mm deep.

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

3.3.11 Care after planting

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

3.3.12 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 100mm in width may be repaired by placing Cynodon spp sods or clumps in the gullies that have begun to form 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 CMD).

3.3.13 Control of Erosion

Eroded areas shall be rehabilitated and monitored for further erosion. Measures shall be taken to prevent the erosion of the Ash dams; this always includes the surfaces and slopes. The disposal facility surfaces include the working areas, completed areas, side slopes, back-stack slopes, and rehabilitated areas. This must be done to prevent erosion of the Ash dams and the rehabilitated areas as well as to minimise the possibility of pollution of the environment.

Erosion protection in rehabilitated areas shall be carried out by the grassed topsoil layer placed over the ash. Reactive procedures are required when erosion forms gullies that cut through the topsoil and into the ash profile. These gullies shall be repaired immediately to control further erosion.

3.3.14 Monitoring

3.3.14.1 Rehabilitated areas

The erosion of rehabilitated areas may form gullies in the topsoil layer above the ash. These gullies must be refilled with topsoil immediately to avoid further contamination of rehabilitated areas.

3.3.14.2 Erosion control

All areas affected by erosion shall be repaired returned to their original state. All topsoil erosion must be reclaimed.

4. AUTHORISATION

This document has been seen and accepted by:

Name	Designation
Thapelo Lesame	System engineer

5. REVISIONS

Date	Rev.	Compiler	Remarks
October 2025	0.1	MA Khohliso	First draft for review
October 2025	1.0	MA Khohliso	Final draft for signatures

6. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- MA Khohliso

7. ACKNOWLEDGEMENTS

N/A