



Scope of Work

GCD

Title: **Scope of Work for
Transportation of Course Ash at
Kendal Power Station
Continuous Ash Disposal
Facility Projects**

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1. INTRODUCTION

1.1 BACKGROUND

Kendal Power Station (Kendal) is a 4 116 MW installed capacity base load coal fired power station, consisting of 6 units. Eskom commenced construction of Kendal in 1982, which was completed in 1993. The ash disposal facility is approximately 2km south-west of the Kendal Power Station terrace, and to the west of the R686.

Ash is generated as a by-product due to the combustion of coal from the power station. As a result of this process Kendal produces about 5.5 million tons of ash per annum. The ash is transported from the boilers to the dry ash dump by means of dual overland conveyors. The ash dump is constructed by the main stacker and standby spreader in a progressive nature by placing a front stack of ash in front of the conveyors down to ground level and a 12m backs tack behind. This ash is currently being disposed of within the premises of the Kendal Power Station, on Eskom owned land in terms of the current power station Water Use Licence.

The original design of the ash dump was done by Jones & Wagener consulting civil engineers in the mid 1980's. The ash dump was designed for a 40 year station life, plus an 8 year contingency area, by diverting the western clean water stream into the next valley and ashing over the western stream valley. As only 60% of the land for the ash dump was purchased at the start of the power station, Kendal did not secure its ashing rights for the total design life and uncontrolled private surface coal mining took place on the remaining area. This resulted in the original ash dump design no longer being feasible to construct as the required western clean water stream diversion dam could no longer be built on the disturbed coal mine area. The remaining properties required for the ash dump construction were purchased in 2008.

Due to this situation, the footprint of the ash dump was constrained within the original design footprint on the current dump site, to the area between the northern and western clean water streams, which resulted in a loss of about 20% of the original design area. This loss of dump capacity, together with a higher ash volume due to poorer quality coal, higher generating loads and a lower ash dump density than assumed in the original design, together with the recent increase in the required station life to 60 years, resulted in the current ash dump site not being able to provide ashing capacity for Kendal's remaining life.

1.2 PROJECT OVERVIEW

Due to the need to obtain an Integrated Environmental Authorisation (including Waste) and a Water Use Licences (WUL) for the ashing operations for the remaining area of the continuous ash dump on the new properties and the new 30 year ash disposal facility, Zitholele Consulting were appointed to carry out an EIA study to assess the environmental risks and determine the optimum dump construction and required mitigation works, in order to provide continuous ashing capability for Kendal's 60 year life. The Integrated Environmental Authorization (IEA) was issued on 28 July 2015 for a period of 5 years and WUL was issued on 18 December 2015.

Current environmental legislations require that the construction and operation of an ash disposal facility, must comply with all relevant environmental legislation such as the National Environmental Management Act, Act No. 107 of 1998, National Environmental Management Waste Act, Act No. 59 of 2008 and the National Water Act, Act No. 36 of 1998. Therefore, the ash disposal facility was required to obtain the Environmental Authorisation, Waste Management Licence and the Water use Licence in order to comply with environmental legislation.

The Kendal ADF is currently an unlined dry stack ash dump. The ADF is designed to have one unlined phase and four lined phases as mentioned in the ADF phasing and development section. Ash reporting to the Kendal ADF is classified as a Type 3 waste which requires a Class C landfill barrier.

The design, as prescribed by the Norms and Standards, referenced above, takes into account the specific conditions for the site and waste body and the availability of material. Therefore, stemming from the foregoing, the following barrier design is proposed (from top to bottom):

As part of the conditions of environmental approval, the detailed design drawings for the Class C liner were completed with input from the Department of Human Settlements, Water and Sanitation. DWS have approved the design drawings for the Class C performance liner, with the additional requirement for a 300mm layer of coarse ash to be placed between the geomembrane and the waste body. Eskom deems the ash material as part of the liner system and construction method statement of placement of the material is essential for the longevity of the liner.

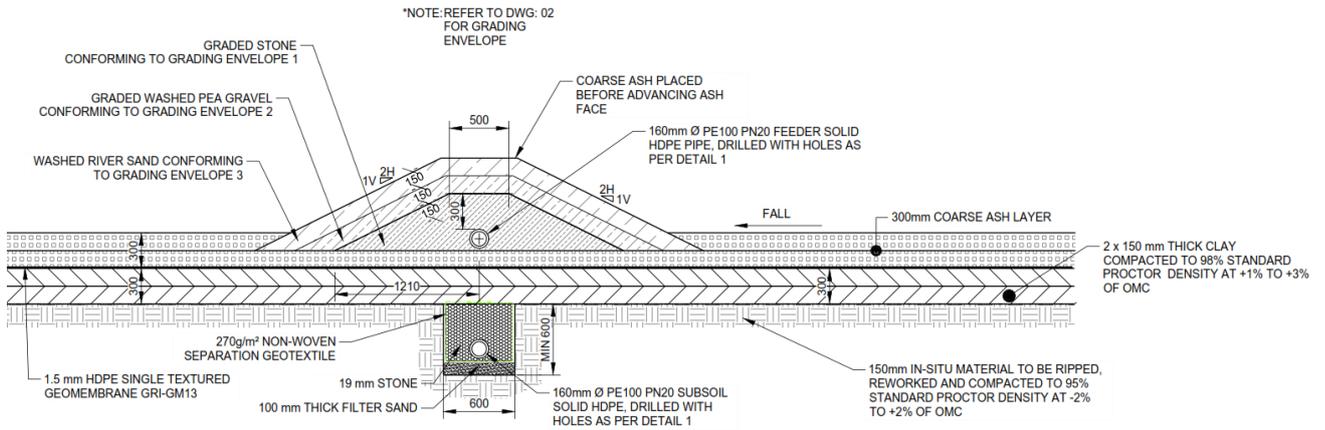


Figure 1 Liner Details

Proposed barrier design

- Ash waste body;
- **Drainage layer of coarse ash;**
- Leachate collection finger drains consisting of the following:
 - o Graded washed filter sand;
 - o Graded washed pea gravel;
 - o Graded washed stone;
 - o Holed HDPE pipes.
- 1.5mm HDPE single textured geomembrane; and
- 300mm thick low permeable subgrade layer with a maximum permeability of 1×10^{-6} cm/s.

In discussions with Kendal PS operations team and Eskom GTE (Civil), it was concluded that ash can be sourced from the power station and used as a drainage/protection layer across the footprint of the ADF, after screening to the below indicated envelope. This should greatly reduce the capital expenditure for each phase; alternatively, a washed coarse river sand is required which would have a substantial cost implication.

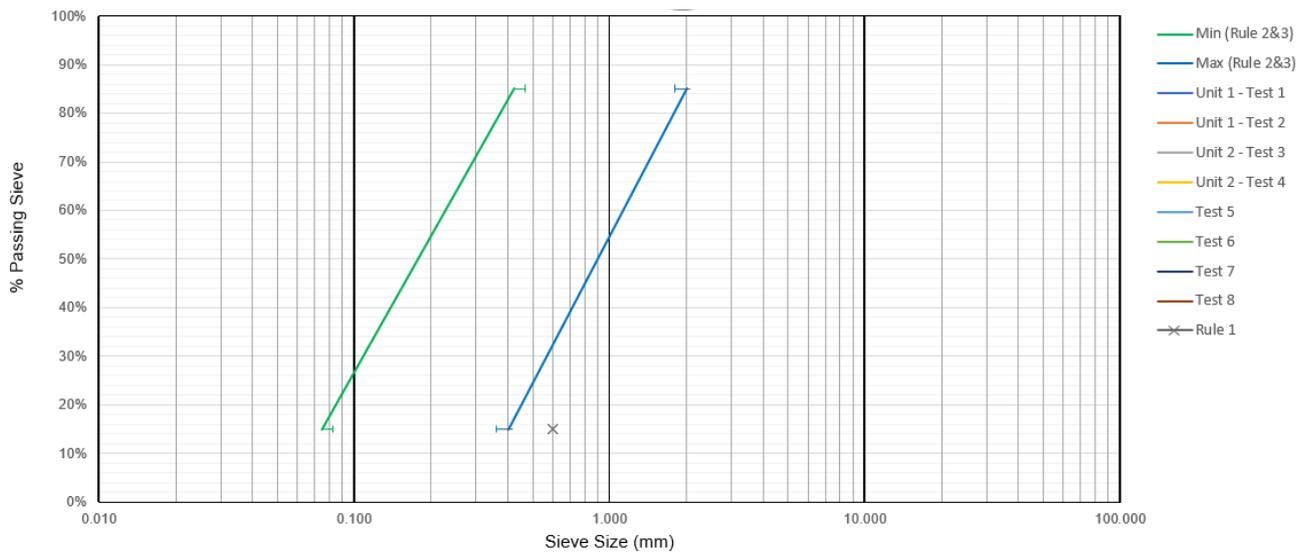


Figure 2 Coarse Ash Envelope

The coarse ash layer shall be placed and spread over filter sand in 150mm layer and care should be taken to avoid damaging the liner during the process. It should be noted that coarse ash can only be placed on the geomembrane during the coolest parts of the day, when the geomembrane core temperature is less than 45°C. This is done to reduce the entrapment of wrinkles under the layer of coarse ash and to keep the strain in the geomembrane below 3%.

As stated above, the site works instruction confirms that ash will be a free issue material from the Kendal Power Plant and will need to be transported from the Kendal Emergency Dump (E-Dump) located inside Kendal Power Station to the Ash disposal facility which is 18km from the E-dump. The ash will be in a wet state and will be temporarily stockpiled to dry out at the Kendal Emergency Dump.

The transportation and stockpiling of the coarse ash are necessary steps in the process to comply with the DWS design requirements. A decision was taken during the detailed design phase to truck course ash from the E-Dump to the Contractor’s lay-down area. The distance from the E-Dump to the Contractor’s lay-down area is 13km, one-way trip.

Hence Kendal Power Station should undertake actions that will enable it to comply with the latest legislations.

2. SUPPORTING CLAUSES

2.1 SCOPE

2.1.1 Purpose

2.1.2 The purpose of this document is to provide a high-level scope of work outlining the activities which are required by the Contractor. Applicability

This document applies to Kendal Power Station.

2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs:

2.2.1 Normative References

1. Kendal Ash Dump and Dam Operations and Maintenance Manual.
2. Concept Design Report for Kendal's Continuous and Emergency Ash Disposal Facilities Ref: 12810, 5 May 2014.
3. Kendal Power Station Existing Area Water Use Licence.
4. Water Use Licence for new properties.
5. DWS approval in principal letter.
6. Kendal Extension of Ashing Infrastructure, User Requirement Specification.
7. Kendal Emergency Dump Extension, User Requirement Specification.
8. SANS 10286, Mine Residue.
9. SANS 1200 series, standardized specification for Civil Engineering Construction.
10. The National Water Act & Regulation GN704.
11. Environmental Protection Acts NEMA & NEMWA and regulations.
12. Kusile and Kendal Power Stations Ash Disposal Facilities Waste Classification Report, Ref: JW030/13/D121 - Rev 3, January 2014.
13. All work shall be conducted in accordance with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) as amended.
14. Kendal Continuous Ash Disposal Facility Project – Detailed Design Report

15. 379-KEN-BEEC-D00035-1: Kendal Power Station Emergency Dump Extension Project Employers Works Information.
16. Kendal Continuous Ash Disposal Facility Project – Works Information Phase 2
17. Kendal Continuous Ash Disposal Facility Project – Works Information Phase 3

2.2.2 Informative References

18. The National Environmental Management Act (No. 107 of 1998) and 2014 Environmental Impact Assessment Regulations, GN R 982.
19. The National Environmental Management Waste Act (No. 59 of 2008)
20. The National Water Act (Act No. 36 of 1998).
21. Kendal Power Station Ash Disposal Facility Project: Environmental Impact Assessment Report.
22. ENV13-R019 Water management policy.
23. 240-4332798, Engineering policy.
24. Manage Technical Risk (240-46953787).
25. Hazard and Operability Analysis (HAZOP) Guideline (240-49230111).
26. Kendal Power Station SHE Statement.
27. Kendal Power Station SHEQ Policy.
28. Kendal Power Station's Integrated Water and Waste Management Plan.

2.3 DEFINITIONS

2.3.1 Classification

Controlled Disclosure: means controlled disclosure to external parties (either enforce by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
ADF	Ash Disposal Facility
DEFF	Department of Environmental, Forestry and Fisheries
DHSWS	Department of Human Settlements, Water and Sanitation

Abbreviation	Description
ADF	Ash Disposal Facility
DEFF	Department of Environmental, Forestry and Fisheries
EDWL	Engineering Design Work Lead
EIA	Environmental Impact Assessment
IEA	Integrated Environmental Authorisation
HAZOP	Hazard and Operability Study
MW	Megawatt
N/A	Not Applicable
PEM	Project Engineering Manager
SME	Subject Matter Expert
WUL	Water Use Licence
WULA	Water Use Licence Application

2.5 RELATED/SUPPORTING DOCUMENTS

- Refer to 2.2 Normative/ Informative References.

3. SCOPE OF WORK

This scope of work aims to provide a high-level summary of the scope of work outlining the activities which are required for a Contractor to transport and stockpile coarse ash at the Contractor's lay-down area.

The following is a summary of the scope of work:

- The site works instruction confirms that ash will be a free issue material located at the ash dump and will need to be transported from the Kendal Emergency Dump (E-Dump).
- Quality control checks will be performed on each 1000m³ processed coarse ash to ensure compliance to the envelope requirements.
- The total quantity of ash to be transported is 110 000m³ for the contract duration.
- The coarse ash must then be trucked from the E-Dump to the Contractor's lay-down area where it should be stockpiled for placement on the geomembrane in the Ash Disposal Facility (ADF) Phase 2 and Phase 3. The distance from the E-Dump to the Contractor's lay-down area is approximately 26km, return trip.
- The supplier will be required to preserve the transported material until is placed on the liner by the other contractor.

- The above activities must be done in an environmentally friendly manner and comply with Legislative requirements.
- The supplier will be required deliver 1500m³ of course ash per day for the duration of five months.
- The supplier will be required to supply a loader that will load approved material on trucks for transportation
- The transportation of ash will be from 7:00am to 17:00 from Monday to Saturday.

4. DELIVERABLES

- Attendance of bi-Weekly and/or ad-hoc meetings with the core team.
- Weekly and monthly reports.
- All work shall be conducted in accordance with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) as amended.
- Supply Eskom with a Schedule and Estimated transported, Stockpiling and Placement volumes to support the schedule. Plant should be indicated on the schedule and a letter stating that the specific plant will be available for the duration of the project life.
- Continuously present the findings to Eskom Engineering for review, challenge, recommendations and approval.
- Ensure that the work is to be done with no impact on the station's performance.
- Provide envisaged program/schedules for the above phase of the scope of work.
- Screen, Truck and place the coarse ash in the time frame as indicated in this document.

5. AUTHORISATION

This document has been seen and accepted by:

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6. REVISIONS

N/A

7. DEVELOPMENT TEAM

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

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- Saihen Govindasami

8. ACKNOWLEDGEMENTS

N/A