

 Eskom	Standard	Technology
---	----------	------------

Title: **Geotechnical Standard for Coal Stockyard and Ash Dam/Dump Site Investigation**

Unique Identifier: **240-92460850**

Alternative Reference Number: **N/A**

Area of Applicability: **Engineering**

Documentation Type: **Standard**

Revision: **2**

Total Pages: **12**

Next Review Date: **March 2023**

Disclosure Classification: **CONTROLLED DISCLOSURE**

APPROVED FOR AUTHORISATION
☒ TECHNOLOGY ENGINEERING
DOCUMENT CENTRE ☎ X4962

Compiled by



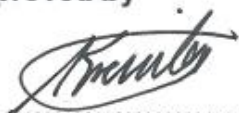
T. Chokoe

Engineer

Geotechnical Engineering
CoE

Date: 22 March 2018

Approved by



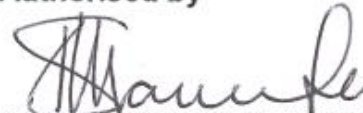
A. Kreuter

Chief Engineer

Geotechnical Engineering
CoE

Date: 23-03-2018

Authorised by



T. Mavunda

Acting Manager

Geotechnical Engineering
CoE

Date: 23/03/2018

Supported by



G. Dudenska

Civil TC Chairperson

Date: 23/03/2018

PCM Reference : **240-53573079, Perform Geotechnical Engineering**

SCOT Study Committee Number/Name : **Geotechnical Engineering Committee (SC 10-02)**

CONTENTS

	Page
1. INTRODUCTION	3
2. SUPPORTING CLAUSES	3
2.1 SCOPE	3
2.1.1 Purpose	3
2.1.2 Applicability.....	3
2.2 NORMATIVE/INFORMATIVE REFERENCES.....	3
2.2.1 Normative	3
2.2.2 Informative.....	3
2.3 DEFINITIONS.....	3
2.3.1 Disclosure Classification	4
2.4 ABBREVIATIONS.....	4
2.5 ROLES AND RESPONSIBILITIES.....	4
2.5.1 The role of the Engineering Centres of Excellence is provided below:.....	4
2.5.2 Engineering Design Work Lead.....	4
2.5.3 Specialist or Review Engineer.....	4
2.6 RELATED/SUPPORTING DOCUMENTS.....	5
3. GEOTECHNICAL DOCUMENTATION REQUIREMENTS.....	5
3.1 PROJECT DOCUMENTATION.....	5
3.2 STABILITY ASSESSMENTS OF EXISTING WET/DRY ASH DISPOSAL FACILITY	5
3.3 EXISTING OR NEW DRY/WET ASH DISPOSAL FACILITY	6
3.4 EXISTING OR NEW COAL STORAGE FACILITY.....	6
4. AUTHORISATION.....	7
5. REVISIONS	7
6. DEVELOPMENT TEAM	8
7. ACKNOWLEDGEMENTS	8
APPENDIX A : GEOTECHNICAL CHECKLIST FOR ASH FACILITIES & CSY.....	9

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

1. INTRODUCTION

This document outlines the general minimum requirements as well as information required to conduct geotechnical investigations for Dry/Wet Ash Disposal facilities and Coal Storage facilities within Eskom Holdings. This is to ensure that the required information is captured in the Required Operational Capability (ROC) document and will subsequently assist in the preparation of the geotechnical investigation scope of work for new or extension of existing Coal Storage and Ash Disposal Facilities within Eskom Holdings Limited.

2. SUPPORTING CLAUSES

2.1 SCOPE

2.1.1 Purpose

The purpose of this document is to provide a basis provide input variables to initiate geotechnical investigations and/or study for dry/wet ash disposal facilities and coal storage facility projects within Eskom Holdings Limited.

This document is not intended as a comprehensive list of information required to initiate geotechnical investigations and/or study for ash disposal and coal stockyard facilities within Eskom Holdings. As such, this document should be used in conjunction with other relevant documents consistent with national and international [where applicable] standards and industry best practise for geotechnical site investigations. The Designer remains responsible to request for additional information as deemed necessary.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

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

- [1] ISO 9001 Quality Management Systems.
- [2] Occupational Health and Safety Act (Act 85 of 1993)

2.2.2 Informative

- [3] [240-91244751](#) - Specifications for Geotechnical Investigations
- [4] [240-57127955](#) - Geotechnical and Foundation Engineering Standard
- [5] [240-57127951](#) - Standard for the Execution of Site Investigations

2.3 DEFINITIONS

Definition	Description
Ash Dam	Wet Ash Disposal Facility. Ash Tailings Dam site designated for disposal of ash slurry. Interchangeably Ash storage facility, ash disposal facility.
Ash Dump	Dry Ash Disposal Facility. Landfill site designated for disposal of conditioned ash. Interchangeably Ash storage facility, ash disposal facility.
Client	The person, organisation or agent/cy that provides the brief for the investigation, commissions the work and pays for it.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Definition	Description
Site investigation	The process by which geological, geotechnical and other relevant information, which might affect the construction or performance of a civil engineering structure or building project, is acquired

2.3.1 Disclosure Classification

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

2.4 ABBREVIATIONS

Abbreviation	Description
ADF	Ash Disposal Facility
CoE	Centre of Engineering Excellence
CSY	Coal Stockyard
EDWL	Engineering Design Work Lead
ISO	International Organisation for Standardization
ROC	Required Operational Capability
SAICE	South African Institute of Civil Engineering
SHE	Safety, Health and Environmental

2.5 ROLES AND RESPONSIBILITIES

2.5.1 The role of the Engineering Centres of Excellence is provided below:

- Apply its expertise, skill and processes to produce a high quality output of exceptional standards in line with the organizational requirement.
- Assist in providing project activities and man hours for project preplanning
- Provide engineering resources to perform the engineering effort

2.5.2 Engineering Design Work Lead

The EDWL has the following reporting lines:

- Accountable for the strategy and all design related activities to the Plant Engineering General Manager. The Centre of Excellence Engineering Manager will prepare, review, assess and score the performance contract of the EDWL.
- The EDWL is appointed by the Engineering Work Delivery Unit Manager in conjunction with the relevant Centres of Engineering Excellence (CoE's) and Authorised by the Plant Engineering General Manager (GM).
- Reports to the Project Engineering Practitioner for technical delivery achieved to baseline scope, schedule and cost.

2.5.3 Specialist or Review Engineer

The Specialist or Review Engineer has a single area of speciality in the design and is responsible for:

- Maintaining a support role during the design period.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

- Reviewing all outputs.
- All design approvals.
- Providing support and advice to all engineers in the design team.
- The technical assurance of technology application.
- Acting as custodian of design guidelines and specifications.

2.6 RELATED/SUPPORTING DOCUMENTS

240-91244751 - Specifications for Geotechnical Investigations.

240-57127951 - Standard for the Execution of Site Investigations

240-57127955 - Geotechnical and Foundation Engineering Standard

3. GEOTECHNICAL DOCUMENTATION REQUIREMENTS

Based on the project definition, the client will provide [inter alia] the following information/documentation [where applicable] prior to geotechnical site investigations.

3.1 PROJECT DOCUMENTATION

- Signed ROC
- Eskom Safety, Health and Environmental Requirements

3.2 STABILITY ASSESSMENTS OF EXISTING WET/DRY ASH DISPOSAL FACILITY

- Piezometer readings [annual]
- Piezometer locations [plan view and sectional view]
- Site access
- Site operations and maintenance manuals
- Existing geotechnical/geological and geohydrological reports on Ash & Founding soils
- Latest survey of existing ash disposal facility
- Anticipated Ash volume requiring disposal
- Proposed timeframe - Preliminary (factual), final interpretative report, and Eskom Engineering review
- Proposed Cost Estimates
- Ash% criteria used: Current basis (STEP actual average of the last two years. (Generation Energy Management)).
- As-built aerial surveys.
- Existing stability and/or remnant life studies
- Existing Design Reports
- Existing plans and as-built drawings
- Inspection Reports conducted by Professional Engineer as prescribed in the O&M manuals
- Relevant environmental regulatory authorisations (including Air Emission License)

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

3.3 EXISTING OR NEW DRY/WET ASH DISPOSAL FACILITY

- EIA Site Selection [including engineering technical input]
- Approved documentation for timeline extension [if deviation from Decommissioning plan]
- Size of selected site
- Interface requirements with internal and external stakeholders
- Previous geotechnical/geological information on Ash & Founding soils
- Topographical Survey of Site
- Waste Classification & Liner Class
- Site layout
- Ash Slurry & Return Water pipeline routings [where applicable]
- Ash Conveyor routings [where applicable]
- Storm Water Management philosophy (Canals & PC dam Layout)
- Infrastructure layout such as mechanical arrangements and operational requirements [where applicable]
- Expected loadings for infrastructures such as boxes, pumping stations, piping, valve arrangements, penstocks etc.
- Anticipated Ash volume requiring disposal
- Expected Vibrations [vibrating machinery only]
- Budget Estimate
- Required start and end date for intended extension of or new ash disposal facility
- Existing as-built drawings
- Relevant environmental regulatory approvals and authorisations (including Air Emission Licenses)
- Water Use License (including areas of conservation sensitivity)
- Borehole Monitoring Reports (as specified in the Environmental Management Plan)
- Inspection Reports conducted by Professional Engineer as prescribed in the O&M manuals
- Survey of existing services

3.4 EXISTING OR NEW COAL STORAGE FACILITY

- Maps or surveys of Coal Stockyard
- EIA Site Selection [including engineering technical input]
- Coal quality specification (coal burn rate)
- Stockpile handling strategy philosophy (Live, Seasonal & Strategic)
- Conveyor, Transfer House & Stacker/Reclaimer layout like bins, sampling systems, truck off-loading facilities, screening plants, road arrangement layout, etc.
- Storm Water Management philosophy (Canals & PC dam Layout)
- Previous geotechnical/geological information [where applicable]

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

- Waste Classification & Liner Class
- Expected loadings [where applicable]
- Maximum stockpile stacking heights
- Approved documentation for timeline extension [where applicable]
- Proposed timeframe
- Budget allocation
- Existing hyper-spectral imaging information to enable observational assessment at the different facilities
- Survey of existing services
- Relevant environmental regulatory approvals
- Water Use License (including areas of conservative sensitivity)
- Ground water (borehole) monitoring reports (as specified in the Environmental Management Plan)
- Inspection Reports conducted by Professional Engineer as specified in the O& M manual

4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Terence Mavunda	COE Manager (Geotechnical Engineering)
Galia Dudenska	Senior Manager (Civil & Structural Engineering)
Andre Kreuter	Chief Engineer (Geotechnical Engineering)
Alicia Simbudayal	Senior Geologist (Geotechnical Engineering)
Lusani Ramathavha	Geologist (Geotechnical Engineering)

5. REVISIONS

Date	Rev.	Compiler	Remarks
March 2015	0.1	L. Mudzanani	Standard for ADF & CSY site investigation
March 2015	0.2	L. Mudzanani	Draft Document for Comments Review
July 2015	1.0	L. Mudzanani	Final update for Rev 1.0
July 2015	1	L. Mudzanani	Final Document for Authorisation and Publication
March 2018	1.1	T. Chokoe	Updated Draft Document for Comments Review Sections: 1.; 2.1.1; 2.3; 2.5.3; 3; 3.1; 3.2; 3.3 and Appendix A
13 March 2018	1.2	T. Chokoe	Final Draft Document for Comments Review
22 March 2018	2	T. Chokoe	Final Rev 2 Document for Authorisation and Publication

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

6. DEVELOPMENT TEAM

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

- Tau Chokoe

7. ACKNOWLEDGEMENTS

- Keshia Jungbahadur

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

APPENDIX A: GEOTECHNICAL CHECKLIST FOR ASH FACILITIES & CSY

Geotechnical Engineering CoE		
	Technology	
<u>Project Documentation</u>		
Signed ROC	☐	
<u>Stability Assessments of Existing Ash Disposal Facility</u>		
Piezometer readings [annual]	☐	
Piezometer locations [plan view and sectional view]	☐	
Site access	☐	
Site operations and maintenance manuals	☐	
Existing geotechnical/geological reports on Ash & Founding soils	☐	
Survey of existing ash disposal facility	☐	
Anticipated Ash volume requiring disposal	☐	
Proposed timeframe - Preliminary (factual) if applicable, Final (interpretive report), and Eskom Engineering review	☐	
Budget allocation	☐	
As-built aerial surveys	☐	

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Remnant life results based on latest available reports.	☐
Existing Design Reports	☐
Existing plans and as-built drawings	☐
Inspection Reports conducted by Professional Engineer as prescribed in the O&M manuals	☐
Relevant environmental regulatory authorisations (including Air Emission License)	☐
<u>Extension of /or New Ash Disposal Facility</u>	
EIA Site Selection [including engineering technical input]	☐
Approved documentation for timeline extension [if deviation from Decommissioning plan]	☐
Size of selected site	☐
Adequate interface with internal and external stakeholders	☐
Previous geotechnical/geological information on Ash & Founding soils	☐
Topographical Survey of Site	☐
Waste Classification & Liner Class	☐
Site layout	☐
Ash Slurry & Return Water pipeline routings [where applicable]	☐
Ash Conveyor routings [where applicable]	☐
Storm Water Management philosophy (Canals & PC dam Layout)	☐

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Infrastructure layout [where applicable]	☐
Expected loadings	☐
Anticipated Ash volume requiring disposal	☐
Expected Vibrations [vibrating machinery only]	☐
Proposed timeframe - Preliminary (factual) if applicable, Final (interpretive report), and Eskom Engineering review	☐
Budget allocation	☐
Relevant environmental regulatory approvals and authorisations (including Air Emission Licenses)	☐
Water Use License (including areas of conservation sensitivity)	☐
Borehole Monitoring Reports (as specified in the Environmental Management Plan)	☐
Inspection Reports conducted by Professional Engineer as prescribed in the O&M manuals	☐
Survey of existing services	☐
<u>Coal Stockyards</u>	
Maps or surveys of Coal Stockyard	☐
EIA Site Selection [including engineering technical input]	☐
Coal quality (coal burn rate)	☐

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Stockpile philosophy (Live, Seasonal & Strategic)	☐	
Conveyor, Transfer House & Stacker/Reclaimer Layout	☐	
Storm Water Management philosophy (Canals & PC dam Layout)	☐	
Previous geotechnical/geological information [where applicable]	☐	
Waste Classification & Liner Class	☐	
Expected loadings [where applicable]	☐	
Approved documentation for timeline extension [where applicable]	☐	
Proposed timeframe-Preliminary (factual) if applicable, Final (interpretive report), and Eskom Engineering review	☐	
Budget allocation	☐	
Survey of existing services	☐	
Water Use License	☐	
Ground water (borehole) monitoring reports (as specified in the Environmental Management Plan)	☐	
Inspection Reports conducted by Professional Engineer as specified in the O& M manual	☐	
Existing hyper-spectral imaging information to enable observational assessment at the different facilities	☐	
Additional Notes/Comments		

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.