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1. INTRODUCTION

Lethabo power station is a coal-fired power station situated in the northern Free State province. The station has an output capacity of 3708 MW, which is produced by six 618 MW units. The first production units went into commercial operation in December 1985 and the last unit was commissioned in December 1990. The station has several dams which perform various functions such as the collection and storage of clean and dirty storm water, the collection and storage of dirty process water and the storage of raw water for production purposes.

As per the National Water Act (NWA) and the Dam Safety Regulations Government Notice R139, a dam safety evaluation of a Category II or III dam must be carried out by an approved professional person (APP) to identify any actual or potential shortcomings in the condition of the dam or in the quality and adequacy of the procedures followed for the maintenance, operation and monitoring of behavior that might endanger human lives, cause damage to property, or have an adverse impact on resource quality.

A dam safety evaluation must be conducted by an approved professional person on the following dams at Lethabo Power Station:

- North and South raw water reservoirs (Capacity 885,000 m³)
- Main storm water dam (Approximate capacity 131,000 m³)
- Clean station drains dam (Approximate capacity 100,750 m³)
- Dirty station drains dam (Approximate capacity 83,125 m³)
- Emergency dam (Approximate capacity 43,750 m³)
- Oil Ponds (Approximate capacity 29,000 m³)
- Clean ash dam (Approximate capacity 42 225 m³)
- Dirty ash dam (Approximate capacity 40 400 m³)
- Winston Philip Dam (Approximate capacity 15 000 m³)
- North east corner dam (Approximate capacity 9 000 m³)

During the dam safety evaluation, it must be considered whether the safety norms pertaining to design, construction, monitoring, operation, performance and maintenance of the dam satisfy acceptable dam engineering practices.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document covers the scope of works and requirements relating to the dam safety evaluation for Lethabo Power Station. The *works* are to be performed by the *Contractor*. The scope includes the following:

- Submission of the required application documents and letter to the Dam Safety Office (DSO) for the appointment of one of the *Contractor's* employees as the Approved Professional Person (APP) for the works.
- Dam safety evaluation of one (1) category I dam i.e. Main storm water dam
- Dam safety evaluation of two (2) category II dams i.e. North and South raw water reservoirs
- Dam safety evaluation of eight (8) dams that are not classified as dams with a safety risk
- Compilation of a dam safety evaluation report as per the requirements of the National Water Act and the Dam Safety Regulations Government Notice GN139.

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 Submission of the dam safety evaluation reports to the Dam Safety Office (DSO) and the Department of Water and Sanitation (DWS)

- All required engagements with the DSO and DWS, including but not limited to the attendance
 of meetings (in person or virtual), responding to queries (via email, telephonic, written etc.) and
 any other form of interaction as required during the execution of the works.
- Reviewing the existing operation and maintenance (O&M) manuals (refer to Section 4.2) for each dam and updating the O&M manuals as per the requirements of the NWA and Dam Safety Regulations Government Notice GN 139.
- Reviewing of the existing emergency preparedness plan (EPP) for each dam (Refer to Section 4.2) and updating the EPP's as per the requirements of the NWA and Dam Safety Regulations Government Notice GN 139.

2.1.1 Purpose

The purpose of this document is to provide a scope of work for the appointment of an approved professional person (APP) to conduct the dam safety evaluation and other tasks as listed in this document.

2.1.2 Applicability

This document is applicable to Lethabo Power Station and all other stakeholders involved on the project.

2.2 NORMATIVE / INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following sections.

2.2.1 Normative

- [1] National Water Act, Act 36 of 1998
- [2] National Environmental Management Act, Act no 107 of 1998
- [3] National Environmental Management Waste Act, Act 59 of 2008
- [4] Regulations GN 704 and GN R 139
- [5] NEMWA National Norms and Standards (GN R 634, 635, 636) (2013), DEA
- [6] 32-727 Eskom Safety, Health, Environment and Quality (SHEQ) Policy
- [7] Occupational Health and Safety Act (Act 85 of 1993)
- [8] Lethabo WUL :Licence No. 08/C22F/ABG/1002 FILE NO. 16/2/7/C22F/

2.2.2 Informative

- [9] 240-4332798: Eskom's Engineering Policy
- [10] 240-53113685: Design Review Procedure
- [11] 240-99527377: Inspection Manual for Civil Works
- [12] 240-144332407: Standard for Eskom Power Stations Concrete Remedial Work

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- [13] 240-144387236: Geotechnical Engineering Remedial Work Standard
- [14] 474-58 (Rev1): Document and Records Management
- [15] All Previous Dam Safety Evaluation Reports
- [16] 240-53114002 Engineering Change Management Procedure

2.3 DEFINITIONS

N/A

2.3.1 Disclosure Classification

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

2.4 ABBREVIATIONS

Abbreviation	Description
APP	Approved Professional Person
DSO	Dam Safety Office
DWS	Department of Water and Sanitation
EPP	Emergency Preparedness Plan
GN	Government Notice
HDPE	High Density Polyethylene
MW	Megawatt
NWA	National Water Act
O&M	Operation and Maintenance
SHEQ	Safety, Environment, Health, Quality
WUL	Water Use Licence

2.5 ROLES AND RESPONSIBILITIES

Contractor

The Contractor's responsibilities are as follows:

- Provide the required resources for the project.
- Manage the cost and time for the project.
- Conduct the relevant investigations, assessment, designs, analysis, reports, manuals and construction drawings as detailed in the scope of work.
- Ensure that all relevant Eskom design standards, procedures and guidelines have been adhered to.
- Provide regular feedback on the status of the project.
- Ensure that the scope of work is executed in full.

CONTROLLED DISCLOSURE

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Eskom Engineering

Eskom Engineering's responsibilities are as follows:

- Ensure that the work conducted by the Contractor satisfies the requirements as per the scope of work
- Reviews all submissions made by the Contractor.
- General technical oversight is provided over the works.

2.6 RELATED/SUPPORTING DOCUMENTS

N/A

2.7 PROCESS FOR MONITORING

N/A

3. EMPLOYER'S OBJECTIVES AND PURPOSE OF THE WORKS

The objective and purpose of the *works* is to:

• Conduct the dam safety evaluation on Lethabo Power Station's dams as per the requirements of the National Water Act and the Dam Safety Regulations Government Notice GN 139.

4. SCOPE OF WORKS

4.1 DAM SAFETY EVALUATION

A dam safety evaluation must be conducted by an Approved Professional Person (APP) in accordance with the requirements of the National Water Act and the Dam Safety Regulations Government Notice R. 139, on the following dams at Lethabo Power Station.

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4.1.1 North and South Raw Water Reservoirs



Figure 1: Layout Raw Water Reservoirs

The raw water reservoir has an approximate capacity of 885 000 m³ and is split into two (2) compartments i.e. Northerly and Southerly, and is divided by a division wall. The dam serves the plant with raw water for production processes. The dam is a homogeneous earthfill embankment dam and is lined with high-density polyethylene (HDPE). The HDPE membrane is overlaid with a 75 mm thick concrete slab. Each compartment has a 1400 mm nominal diameter steel inlet/outlet pipeline that leads through the wall, into a valve chamber.

The raw water reservoirs are classified as a category 2 dam with a safety risk.

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4.1.2 Main Storm Water Dam



Figure 2: Layout Main Storm Water Dam

The main stormwater dam is located on the northern side of Lethabo Power Station adjacent to the clean ash dam. The main stormwater dam has an inlet/outlet infrastructure. The inlet gabion structure is located on the southern side of the dam and the outlet gabion structure is located on the northwestern side of the dam. The main stormwater dam has an approximate capacity of 131 000 m³ and the dam is a homogenous earthfill embankment dam with no HDPE lining.

The main stormwater dam is classified as a category 1 dam with a safety risk.

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4.1.3 Clean Station Drains Dam



Figure 3: Layout Clean Station Drain Dam

The clean station drain dam is located on the eastern side of Lethabo Power Station adjacent to the dirty station drain dam and emergency dam. The clean station drain dam has one inlet concrete structure and one gabion outlet structure. The inlet is located on the western side of the dam and the outlet gabion structure is located on the eastern side of the dam. The source of inflow to the dam is from the stormwater catchment that flows from the station via a concrete-lined cut-off trench. Only the dam walls are lined with a geofabric.

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4.1.4 Dirty Station Drains Dam



Figure 4: Layout Dirty Station Drain Dam

The dirty station drain dam consists of one compartment adjacent to the oil ponds. The inflow of water into the dam is from the oil ponds and the dirty stormwater from the station. The dam has one link spillway into the adjacent emergency dam and only the dam walls are lined with a geofabric.

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4.1.5 Emergency Dam



Figure 5: Layout Emergency Dam

The emergency dam is located on the eastern side of Lethabo Power Station adjacent to the dirty station drains dam. The emergency dam has an inlet/outlet infrastructure. The inlet is located on the western side of the dam and the outlet gabion structure is located on the northern side of the dam. The emergency dam has a capacity of 43 750 m³ and receives wastewater from the dirty station drains dam. The dam is a homogeneous earthfill embankment dam and has a geofabric liner only on the dam walls.

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4.1.6 Oil Ponds



Figure 6: Layout Oil Separation Ponds

The oil ponds are located on the eastern side of Lethabo Power Station with a channel inlet/pipe outlet infrastructure. The inlet leads from the concrete silt trap that is located on the northern side of the ponds and the outlet concrete structures are located on the southern side of the final ponds. The oil ponds have a combined capacity of 29 000 m³ and is split into four (4) compartments, with the inflow from the silt trap, flowing into one of the two compartments on the northern side. Flow then occurs through a submersed penstock and decants into either of the two compartments on the southern side, trapping the oil in these first compartments. The compartments are divided by earth division walls. The ponds assist the plant with oil separation from the wastewater as part of the ash production process. The ponds are non-elevated homogenous earth dams.

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4.1.7 Clean Ash Dam



Figure 7: Layout Clean Water Ash Dam

The clean water ash dam is located on the northern side of Lethabo Power Station adjacent to the main stormwater dam. The clean ash dam has an inlet/outlet structure. The gabion outlet spillway is located on the south-eastern corner of the dam next to the outlet spillway. The gabion outlet structure leads from the dam into the wetland. The dam is a homogeneous earthfill embankment dam with no HDPE lining.

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4.1.8 Dirty Ash Dam



Figure 8: Layout Dirty Water Ash Dam

The dirty water ash dam is located east of the ash disposal facility. The dam receives dirty water from the ash disposal facility and is not lined with HDPE.

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4.1.9 Winston Philip Dam



Figure 9: Layout Winston Philip Dam

The Winston Philip dam is situated on top of the ash dump. The dam is lined with HDPE and stormwater runoff from the ash dump is contained within the dam.

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4.1.10 North East Corner Dam

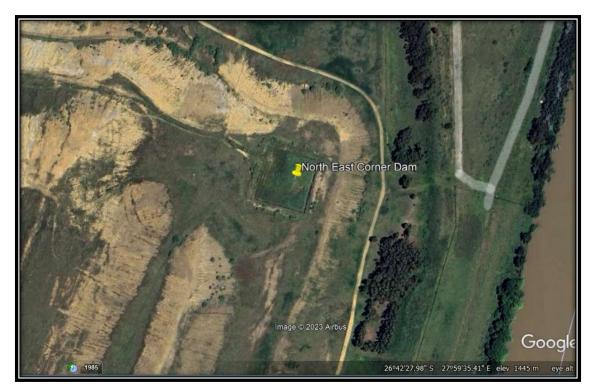


Figure 10: Layout North East Corner Dam

The north east corner dam is located on the ash disposal facility, on the north east side of Lethabo Power Station. The dam collects stormwater runoff from the ash disposal facility. The dam is lined with HDPE.

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4.2 OPERATION AND MAINTENANCE MANUAL & EMERGENCY PREPAREDNESS PLAN

The *Contractor* is required to review the existing operation and maintenance manual for each dam and must update the manuals where required, ensuring that the manuals meet all requirements as per the National Water Act, the Dam Safety Regulations Government Notice R. 139 and best practice guidelines. The *Contractor* is to note that the Raw Water Reservoirs and the Main Stormwater Dam are classified as a category 2 and category 1 dam with a safety risk, respectively,.

The *Contractor* is required to review the existing emergency preparedness plan for each dam and must update the plans, ensuring that the EPP meets all requirements as per the National Water Act, the Dam Safety Regulations Government Notice R. 139 and best practice guidelines. The *Contractor* is to note that the Raw Water Reservoirs and the Main Stormwater Dam are classified as a category 2 and category 1 dam with a safety risk, respectively,.

The *Contractor* must consider, in consultation with the *Client*, whether a combined operation and maintenance manual and emergency preparedness plan, or a separate operation and maintenance manual and emergency preparedness plan is the most effective for operation, maintenance as well as disaster management related to the specific dam and the downstream area threatended by the failure of the specific dam. Currently the operation and maintenance manual and the emergency preparedness plan is combined into one (1) document for each of the dams on site.

The existing operations and maintenance manuals and emergency preparedness plans for the dams are as follows:

Document Number	Document Title
WPLAN02	Operation and Maintenance Manual and Emergency Preparedness Plan for the Station Drain Dams at Lethabo Power Station
WPLAN03	Operation and Maintenance Manual and Emergency Preparedness Plan for the Sewage Plant – Maturation Pond at Lethabo Power Station
WPLAN04	Operation and Maintenance Manual and Emergency Preparedness Plan for the Raw Water Reservoirs at Lethabo Power Station
WPLAN05	Operation and Maintenance Manual and Emergency Preparedness Plan for the Main Storm Water Dam at Lethabo Power Station
WPLAN06	Operation and Maintenance Manual and Emergency Preparedness Plan for the Ash Dams at Lethabo Power Station

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4.3 GENERAL

1. The Contractor takes full professional accountability and liability for the works undertaken as part of the scope of work.

- 2. The Contractor performs the works in compliance with legislation, rules and regulations, applicable national and international engineering codes, environmental standards, other applicable standards, statutory requirements and this scope of work.
- 3. No deviation from this scope of work and its referenced documents is permissible without documented acceptance from the Project Manager. The Contractor includes a list of exceptions and/or clarifications as part of his tender. This list of exceptions and/or clarifications includes the section deviated from as reference number, the requirement in question and a detailed explanation of the deviation. In the event of conflicts or discrepancies between any of the specifications, the Contractor notifies the Project Manager for resolution in writing.
- 4. The Contractor adheres to all requirements, codes of standards and regulations stated in this scope of works.
- 5. Any discrepancy or ambiguity between the Employer's Specifications or requirements is to be immediately brought to the attention of the *Project Manager* for clarification.
- 6. All documentation, as specified in this document, forms part of the works and is supplied to the Project Manager by the Contractor. The Employer reserves the right to issue the Contractor's designs/drawings/documents to other *Contractors* for purposes of maintenance, spares, verifications, modifications in future or any other purposes required by the Employer. The Employer has total rights to use the designs/drawings/documents as the *Employer* requires. The *Contractor* notes that all documentation supplied to the *Employer* become the property of the *Employer* upon completion of the works.
- 7. The Contractor is required to conduct all engagements with the relevant authorities (DWS, DSO etc.) in order to execute the full scope of works as detailed in this document.

4.4 DELIVERABLES

The Contractor provides the following document deliverables as part of the works

4.4.1 Tender Phase

The Tenderer submits the following as a minimum in the tender submission

- 1. The key resource of the project team must provide proof of registration as an Approved Professional Person (APP) as per the National Water Act and the Dam Safety Regulations Government Notice GN R. 139.
- 2. Tenderer's company profile showing relevant experience on previous projects of similar scope (i.e., experience in conducting dam safety evaluations for dams with a safety risk).
- 3. CV's of the proposed key resources each having a minimum of 5 years' relevant experience.
- 4. Technical proposal detailing the work methodology, which complies to the full scope and describes how the scope will be executed
- 5. A Level 3 scheduled for the assigned scope clearly highlighting all activities involved, major milestones and provision for the Employer review.

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4.4.2 Planning Phase

The *Contractor* submits the following prior to the execution of the works:

- 1. Project specific safety file.
- 2. Detailed risk assessments
- 3. Level 3 schedule (updated)

4.4.3 Post Execution Phase

- 1. Dam safety evaluation report for all the specified dams.
- 2. Operation and Maintenance manuals for all the specified dams.
- 3. Emergency Preparedness Plans for all the specified dams.

5. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Nicolan Govender	Civil Engineer, Lethabo Power Station
Suven Govender	Civil Engineer, Lethabo Power Station
Keshia Brijlal	Engineering Geologist, Lethabo Power Station
Johan Brink	Manager Outside Plant Engineering, Lethabo Power Station

6. REVISIONS

Date	Rev.	Compiler	Remarks
June 2023	1	N. Govender	Final Document for Signatures
October 2023	2	N. Govender	Document updated to remove scope i.e. section 4.3 and 4.4

7. DEVELOPMENT TEAM

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

Nicolan Govender

8. ACKNOWLEDGEMENTS

None

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APPENDIX A: DRAWING LIST

Drawing Number	Drawing Title
0.63/10676	Lethabo Power Station Dirty Ash Water Dam Layout And Details
0.63/2305	Raw Water Reservoir General Arrangement
0.63/2306	Raw Water Reservoir Contract Layout And Access Route
0.63/2307	Raw Water Reservoir Sections And Details
0.63/2308	Raw Water Reservoir Inlet/Outlet Works
0.63/2310	Raw Water Reservoir Spillway Structure
0.63/2311	Raw Water Reservoir Spillway Structure Reinforcement Details
0.63/3865	Raw Water Reservoir Valve Chamber Reinforcement Details
0.63/3866	Raw Water Reservoir Valve Chamber Reinforcement Schedule
0.63/18348	Raw Water Reservoir Equipment Room Plan, Section And Elevation
0.63/19184	Raw Water Reservoir Equipment Room Concrete And Reinforcement Layout Details And Schedule
0.63/49051	AKZ Coding Terrace Drains Station Dams Raw Water Reservoir And Buildings
0.63/51216	Ash Dump Drainage System Main Clean Water Dam
0.63/51217	Main Clean Water Dam Silt Basin, Servitude And Main Dam Cross Section Details
0.63/51218	Main Clean Water Dam Main Dam Canal Section Layout And Detail
0.63/51227	Main Clean Water Dam Silt Basins Layout
0.63/51228	Main Clean Water Dam Layout
0.63/421	Storm And Dirty Water Dams Excavation Details Plan
0.63/422	Storm And Dirty Water Dams Excavation Backfill And Dam Lining Details Sections
0.63/433	Storm And Dirty Water Dams Arrangement And Concrete Details Of Grit Channels For Storage Dam Spillway
0.63/434	Storm And Dirty Water Dams Oil Ponds Arrangement And Details Of Grit Channels And Gates
0.63/435	Storm And Dirty Water Dams Inlet And Overflow Spillways Mk A, Mk B, Mk D Arrangement And Details
0.63/529	Storm And Dirty Water Dams General Arrangement
0.63/664	Storm And Dirty Water Dams Oil Ponds Belt Skimmer Trench Control Gates And Weirs Arrangement And Details
0.63/667	Storm And Dirty Water Dams Oil Ponds Distribution Weirs And Control Gates Concrete Layout And Details
0.63/670	Storm And Dirty Water Dams Access Ramps To Grit Channels At Clean Storage And Oil Ponds Concrete Layouts And Details

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0.63/671	Storm And Dirty Water Dams Spillways And Dia 450 Ac Pipe Into Dirty Water Storage Layout And Details
0.63/49381 SHT1	Storm And Dirty Water Dams Oil And Grid Separation Plant Layout, Sections And Details
0.63/49381 SHT2	Storm And Dirty Water Dams Ash Settling Ponds Concrete Plan , Sections And Details
0.63/49381 SHT3	Storm And Dirty Water Dams Ash Settling Ponds Concrete Plan , Sections And Details
0.63/49381 SHT4	Storm And Dirty Water Dams Concrete Walls And Steel Walkways Plan , Sections And Details
0.63/49383	Storm And Dirty Water Dams
0.63/52433	Storm And Dirty Water Dams Oil Ponds 1 And 2 Modification To Walls And Oil Trap Layout
0.63/52434	Storm And Dirty Water Dams Oil Ponds 1 And 2 Modification To Walls And Oil Trap Layout
0.63/434	Storm And Dirty Water Dams Oil Ponds Arrangement And Details Of Grit Channels And Gates

NB. The drawing list is not exhaustive and additional information will be provided to the Contractor during the execution of the works where required.