

A decorative graphic on the left side of the slide, consisting of three overlapping circular frames. The top frame shows a high-voltage electricity pylon. The middle frame shows a large industrial facility with several tall cooling towers and a body of water in the foreground. The bottom frame shows a close-up of a wind turbine's blades and a yellow crane.

ESKOM WATERWAY SYSTEM Concrete Repair

Eskom Peaking Generation

October 2025

INTRODUCTION

Water is conveyed to the turbines through waterways which are tunnels designed to operate under high pressure

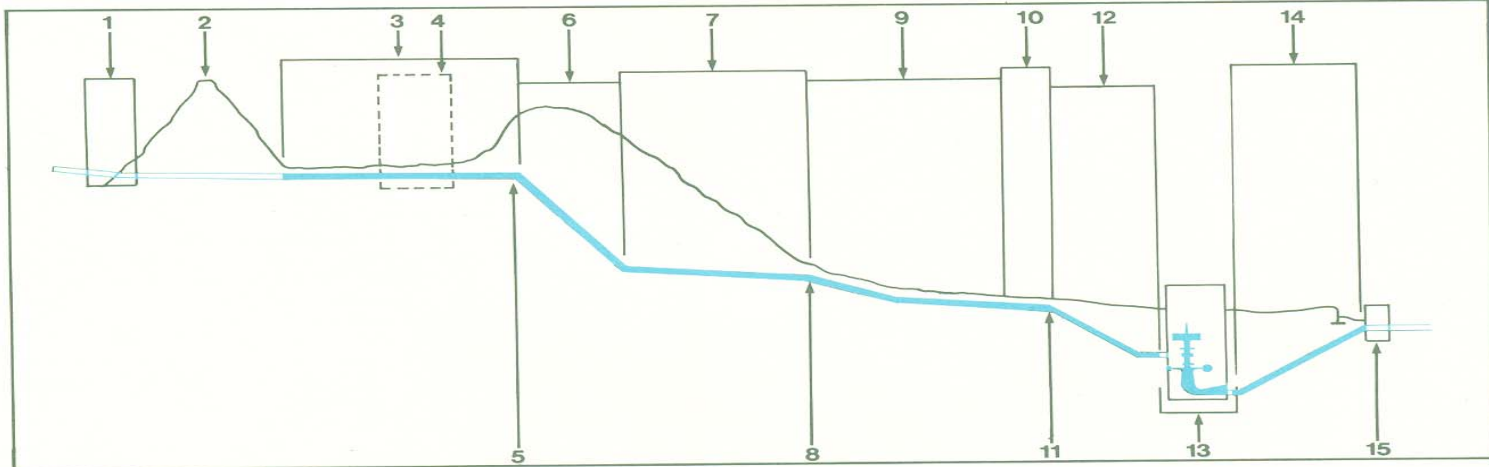
Palmiet Pumped Storage Scheme (PPSS) is a steel lined waterway and Drakensberg and Ingula Pumped Storage Scheme (DPSS & IPSS) consists of a combination of Carbon Steel and concrete lined.

Penstock	Pumped Storage		
	Palmiet	Drakensberg	Ingula
Length (m) Steel lined	1356.1	522.6	1081
Length (m) Concrete lined		3116.4	1934
Diameter (m)	6.2	5.5	6.6
Thickness (mm) Steel lined	23 - 33	23 - 33	38 - 40
Thickness (mm) Concrete lined		500 - 1575	500 - 700
Power Station Commissioning (year)	1988	1982	2016

WATERWAY - PLAN AND SECTION

Algemene uitleg van Palmiet-pompopgaarskema

Lengtedeursnee

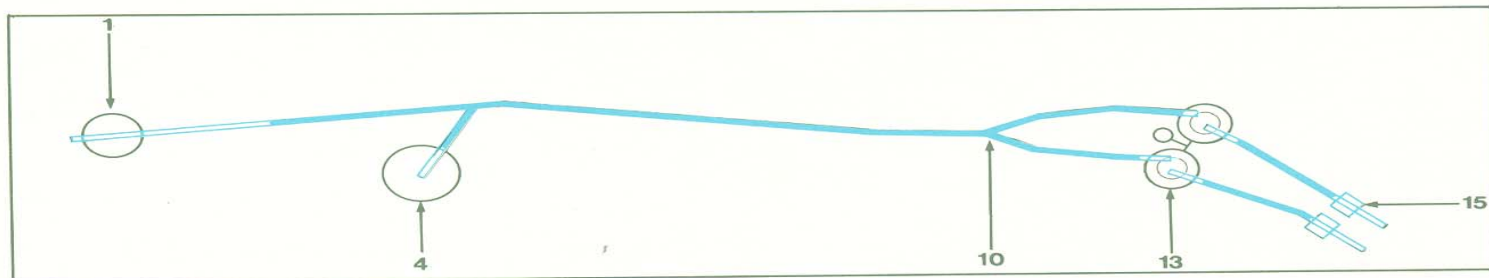


General layout of Palmiet Pumped Storage Scheme

Longitudinal section

Plan

Plan



1. Aanlooptoring
2. Rockviewdam
3. Toevoertunnel
4. Stutenk
5. Portaal
6. Skuins skag
7. Druktonnel
8. Portaal

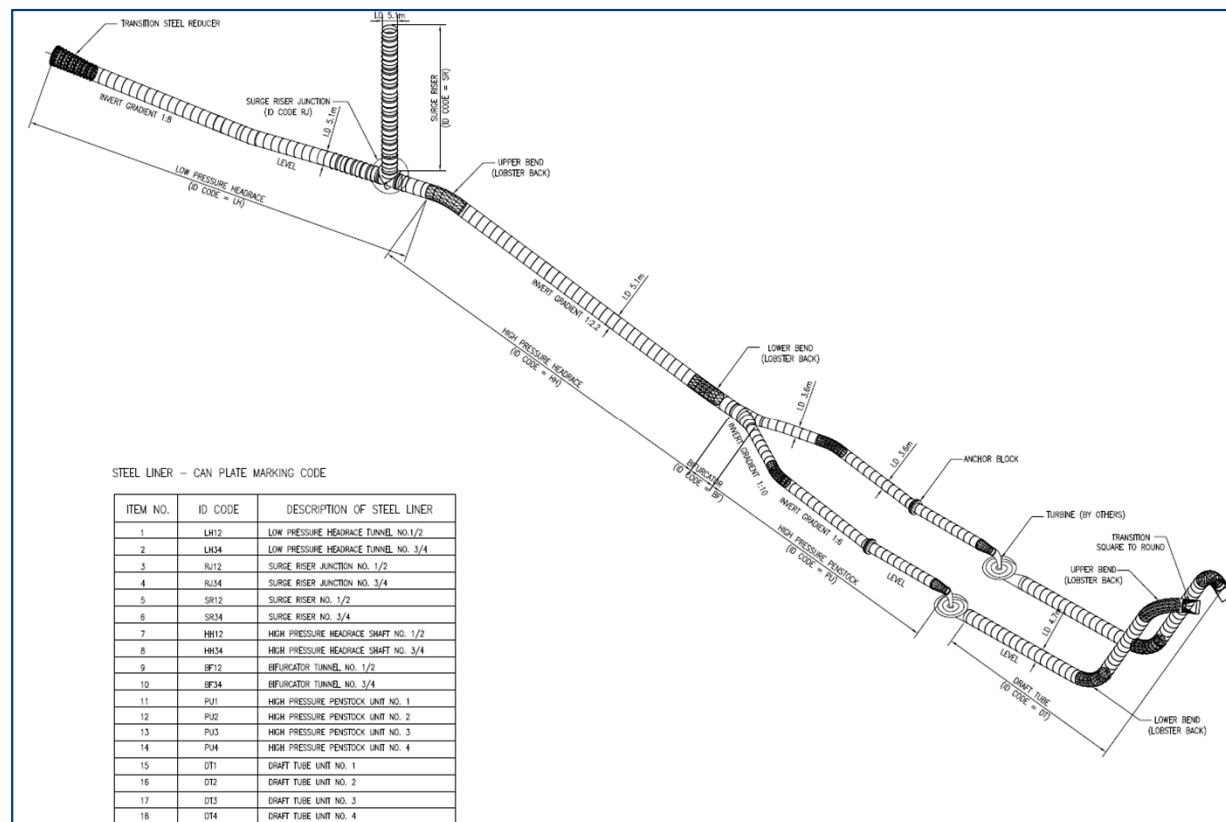
9. Dryfleiding
10. Vertakking
11. Portale
12. Dryfleidingskagte
13. Masjienskagte
14. Afvoerskagte
15. Afvoertorings

1. Headrace tower
2. Rockview dam wall
3. Headrace tunnel
4. Surge tank
5. Portal
6. Inclined shaft
7. Pressure tunnel
8. Portal

9. Penstock
10. Bifurcation
11. Portals
12. Penstock shafts
13. Machine shafts
14. Tailrace tunnels
15. Tailrace towers

WATERWAY COMPONENTS

- Drakensberg Concrete Sections
- Headrace (Tunnel): $\pm 1460\text{m}$, $\varnothing = 6\text{m}$
- Surge Shaft: $H = \pm 90\text{m}$, $\varnothing = 14\text{m}$
- Pressure Shaft and Tunnels: $L = \pm 1250\text{m}$, $\varnothing = 5.5\text{m}$
- Surge Chamber: $H = \pm 90\text{m}$, $\varnothing = 16\text{m}$
- Tailrace Tunnel: $L = \pm 1400\text{m}$, $\varnothing = 5.5\text{m}$



- **Ingula Concrete Sections**

- Twin Low Pressure Headrace Tunnel: $\pm 900\text{m}$, $\varnothing = 6,6\text{m}$
- Twin Surge Shafts $H = \pm 95\text{m}$, $\varnothing = 15\text{m}$
- Twin Pressure Shafts: $H = \pm 80\text{m}$, $\varnothing = 6.3\text{m}$
- Twin Surge Chambers: $H = \pm 90\text{m}$, $\varnothing = 20\text{m}$
- Twin Tailrace Tunnels: $L = \pm 2200\text{m}$, $\varnothing = 9.4\text{m}$

- **Palmiet Concrete Sections**

- 2 x Tailrace Tunnels - 84m and 57m long
- 2 x Draft Tubes
- 2 x Surge Chambers

INSPECTION PHILOSOPHY

An Inspection Philosophy is in place to check and/or repair all degraded concrete and leaks in the waterway over the life of the station

The inspection philosophy and requirements to ensure integrity is as follows:

Station	Visual Inspection	Inspection Period		
		High Stressed Section	Low Stressed Section	Bifurcation
Drakensberg	10 Years	10 Years	10 Years	10 Years
Palmiet	36 Months	15 Years	20 Years	8 Years
Ingula	7 Years	7 Years	7 Years	7 Years

FREQUENCY OF INSPECTIONS

- A station outage is required to perform inspections and repairs

Peaking Outage Philosophy			
Waterways - Inspection frequency and durations			
Station	Drakensberg	Palmiet	Ingula
Outage Frequency	10 Yearly	3 Yearly	7 Yearly
Outage Duration	45 Days	28 Day	45 Days
Activity			
Dewater	3	3	10
Site Activities-Open M/H, construct coffer dams, install pumps, scaffolding/platforms. Divert seepage water.	5		2
Inspection/repairs of waterways (Steel & conc. Lining, NDE Testing)	10		10
Weld Repair	10	10	10
Close M/H, Remove dams, pumps, scaffolding	2	3	1
Rewater	8		10
Commissioning	5	2	2

Concrete areas

All these concrete areas will be inspected with the Eskom Engineer and the areas of repair will be outlined

The following inspections are carried out:

- Visual.
- NDT with Smidt hammer

- **The Contractor therefore makes provisions for the following as a minimum work is planned to be undertaken:**
 - Contractor conducts a detailed structural integrity assessment of the waterways
 - Although Access and working platforms will be supplied by others, where necessary, the Contractor provides an additional platform(s)
 - The Contractor inspects the concrete lining together with the Employer and/or his representative and identifies areas of deteriorated concrete.
 - The Contractor effects repairs to the concrete lining by the removal of deteriorated concrete.
 - The Contractor is required to grout up areas where ground water leakage through the tunnel lining has been identified by the Employer.
 - The Contractor removes all debris.

High level Scope of work

- Crack repair
- Concrete repair
- Repairs by Rope Access
- Repairs of water leaks

All method statements and materials list to be issued to the Employer prior to execution.

- Previous products used:
 - ☐ Sika Top Armatech 110 EpoCem, bonding agent and anti-corrosive coating.
 - ☐ Sika Rep LW cementitious, non-sag patching and repair mortar is applied to within 5 mm of the finished surface.
 - ☐ 40MPa/19mm concrete

Platforms have been designed and manufactured for inspection purposes

The platforms have been manufactured with emphasis on the following:

- A lightweight structure
- Quick assembly (inside the waterway tunnels)
- Movable to maximize time
- Platform components to enter through a 700mm diameter manhole

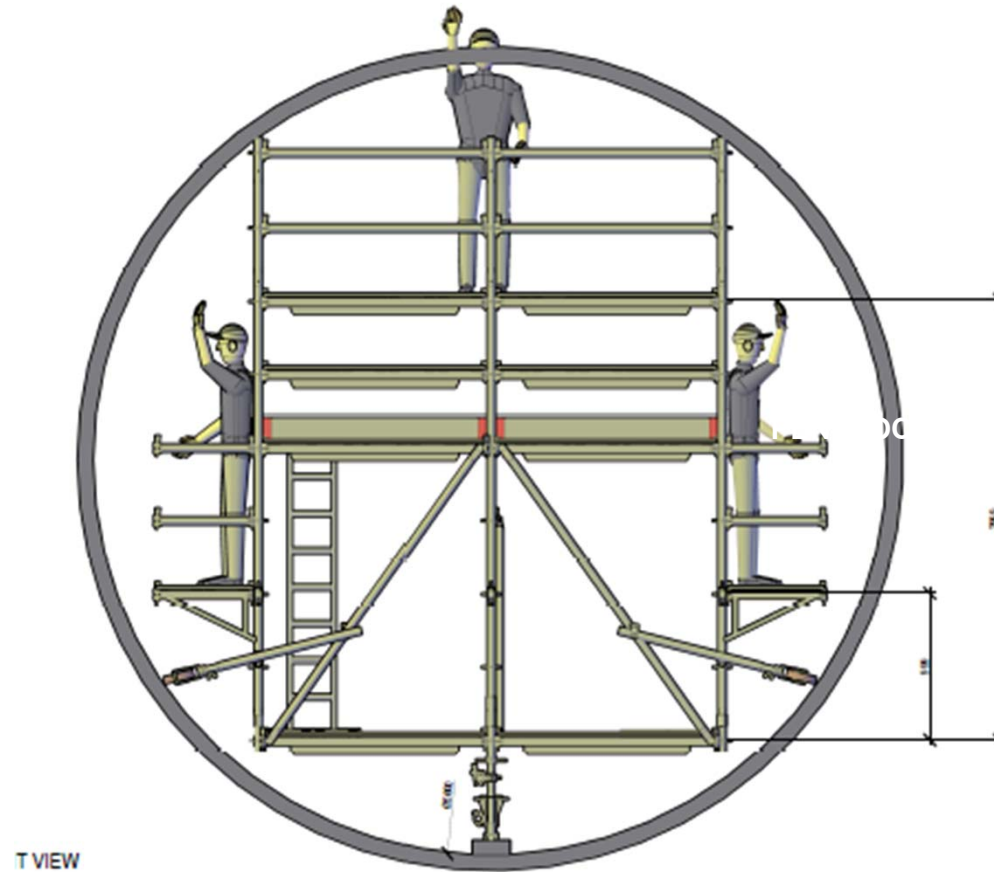
INSPECTION PLATFORMS (CONT.)

- **Palmiet Scaffolding**



INSPECTION PLATFORMS (CONT.)

Drakensberg Scaffolding



- The inspections, operations and use of the platforms in the waterway will be managed by others if or when required do Concrete repairs.
- All repairs to have acceptance testing conducted.

Thank you