

# Kikonge Hydropower Project Ruhuhu River Basin

Presentation to TANESCO

13th March 2014

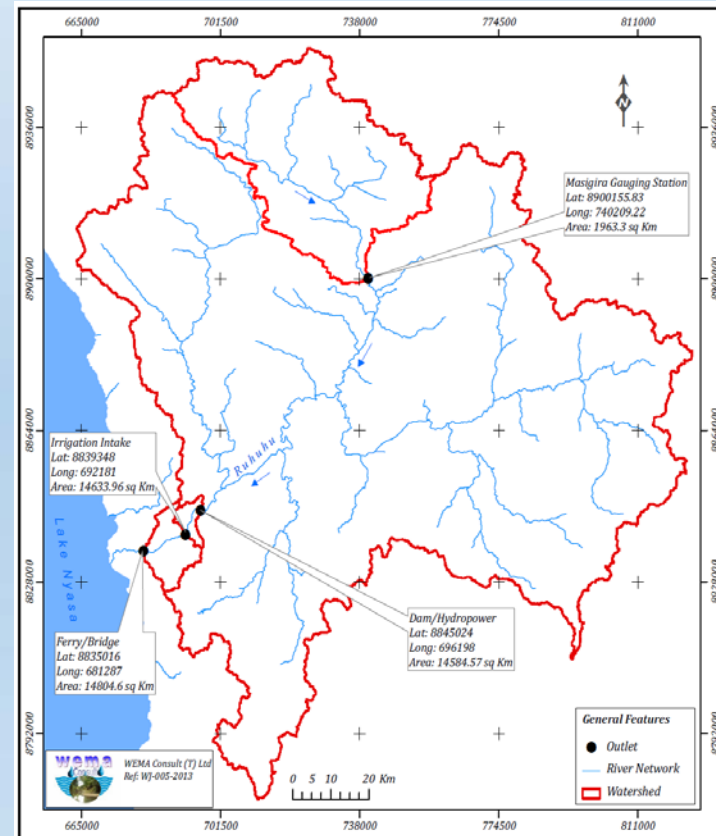


# The Kikonge Hydropower Project

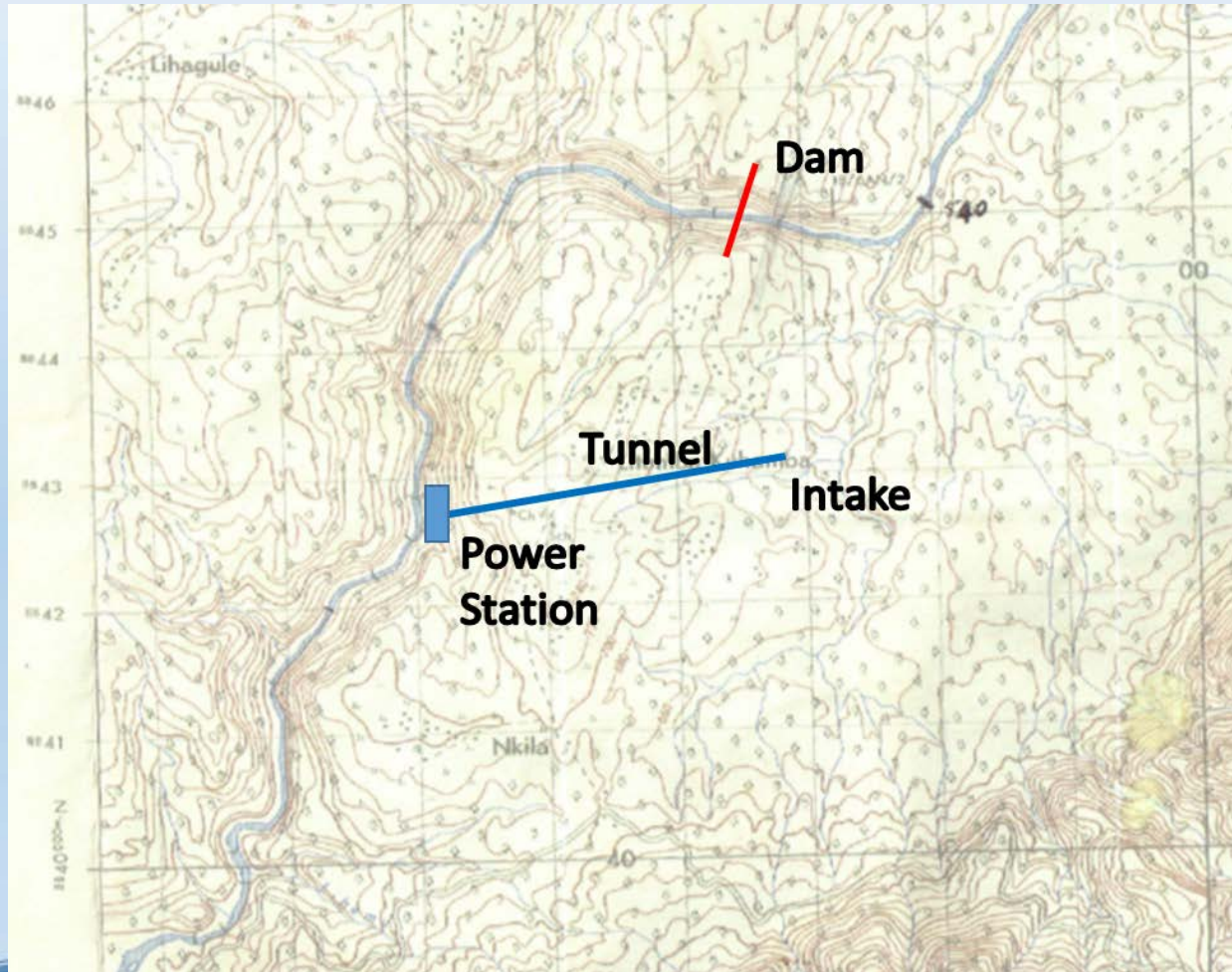
## Location of Ruhuhu River Basin






## Location of Kikonge Site

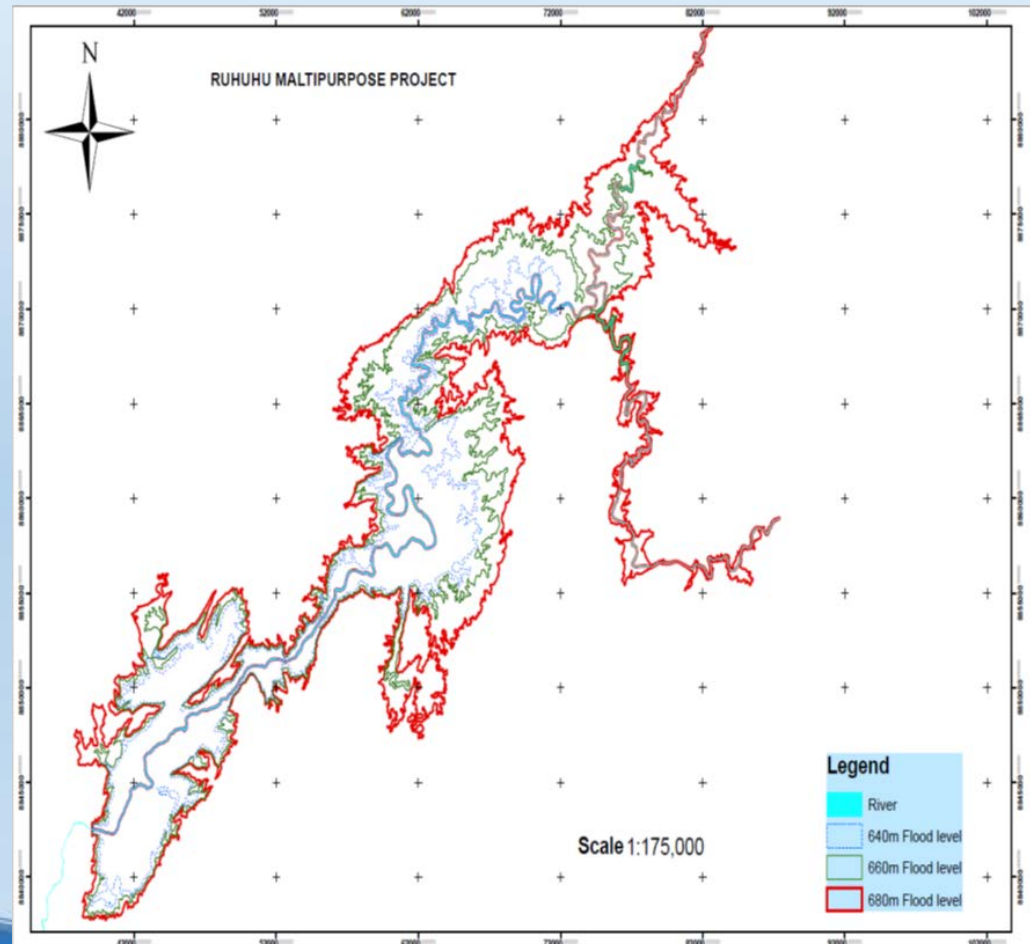


# Kikonge Hydropower Project: Project Layout

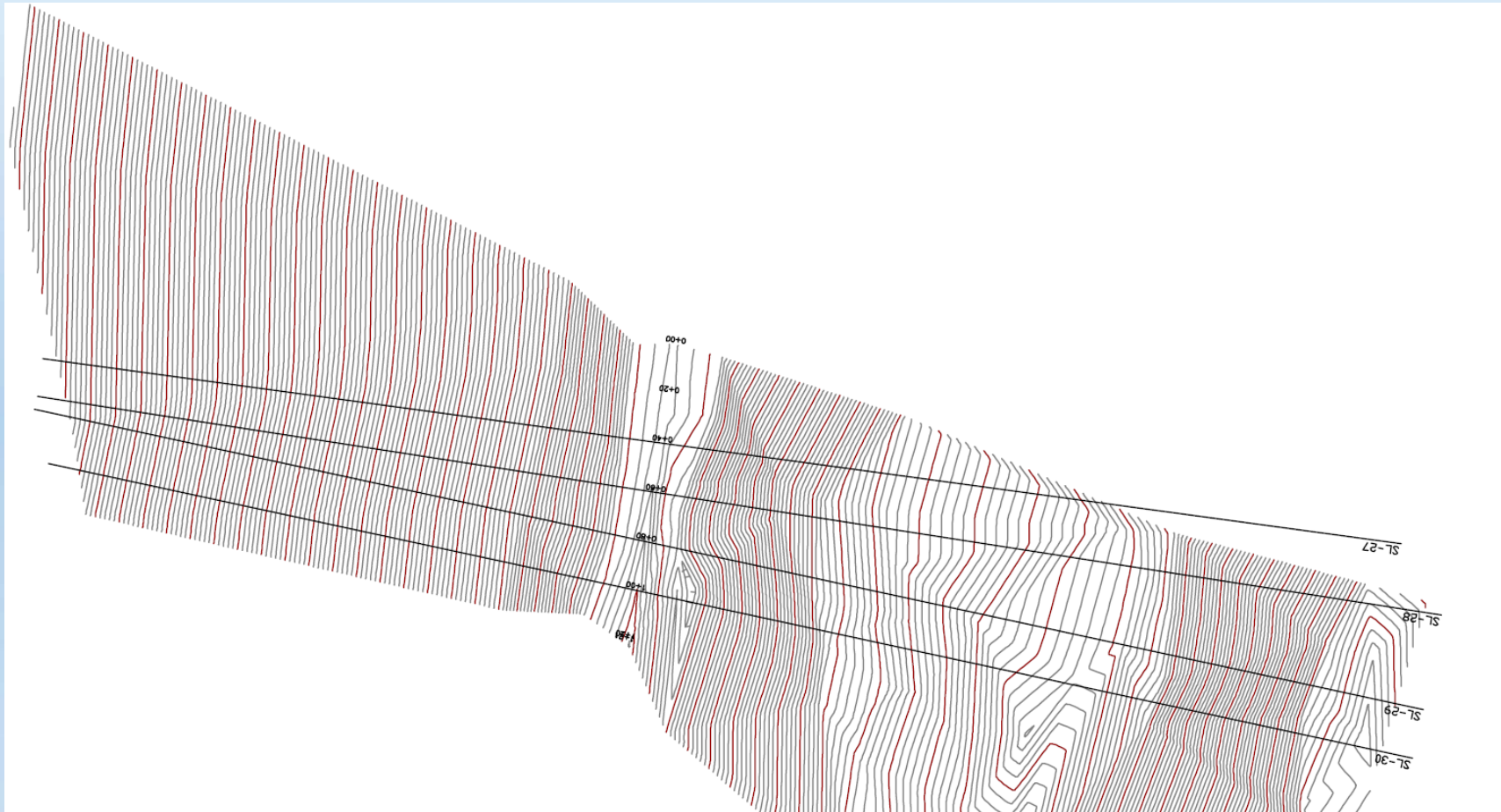


# Kikonge Hydropower Project: Reservoir Area

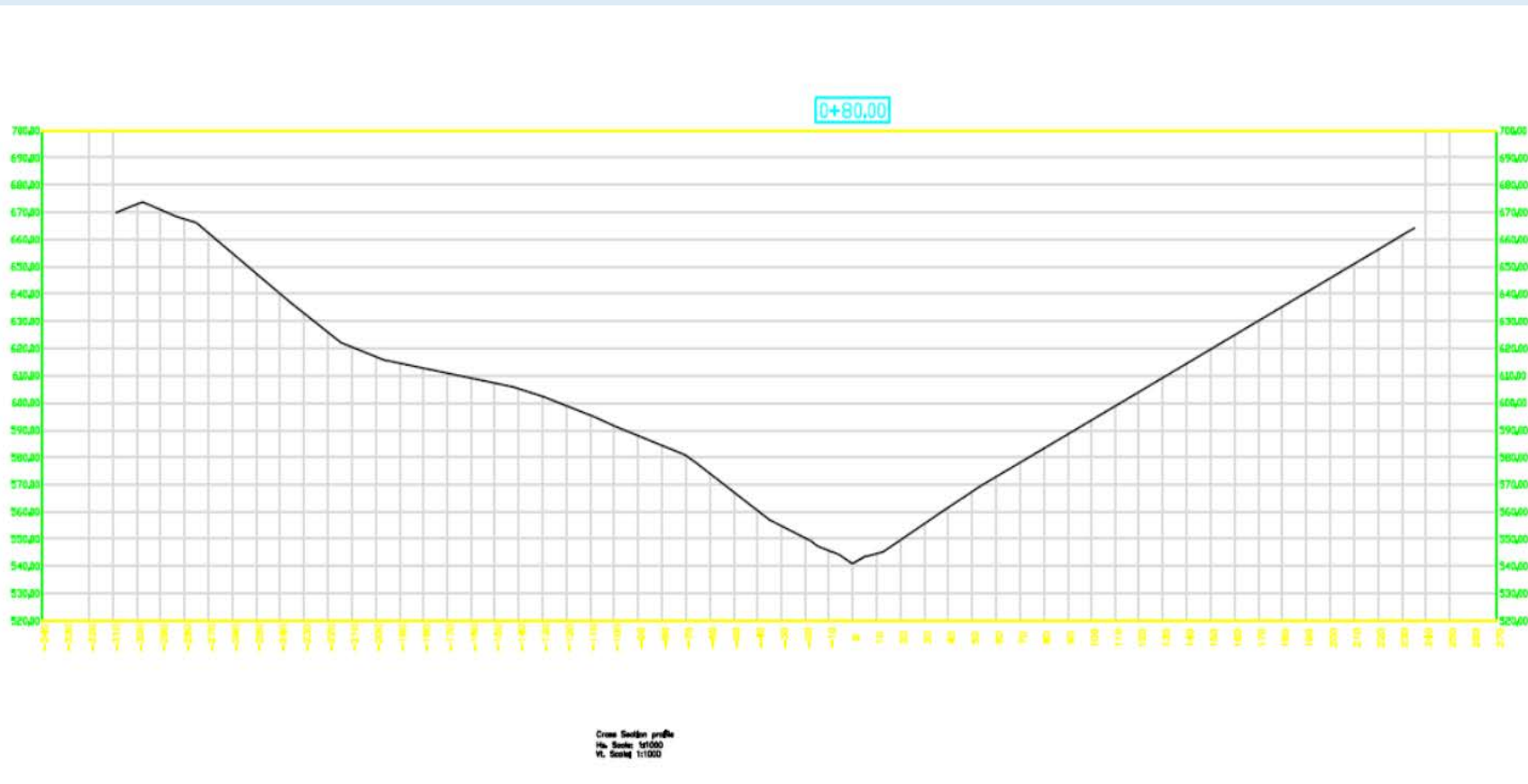
-  — El. 680m
-  — El. 660m
-  — El. 640m



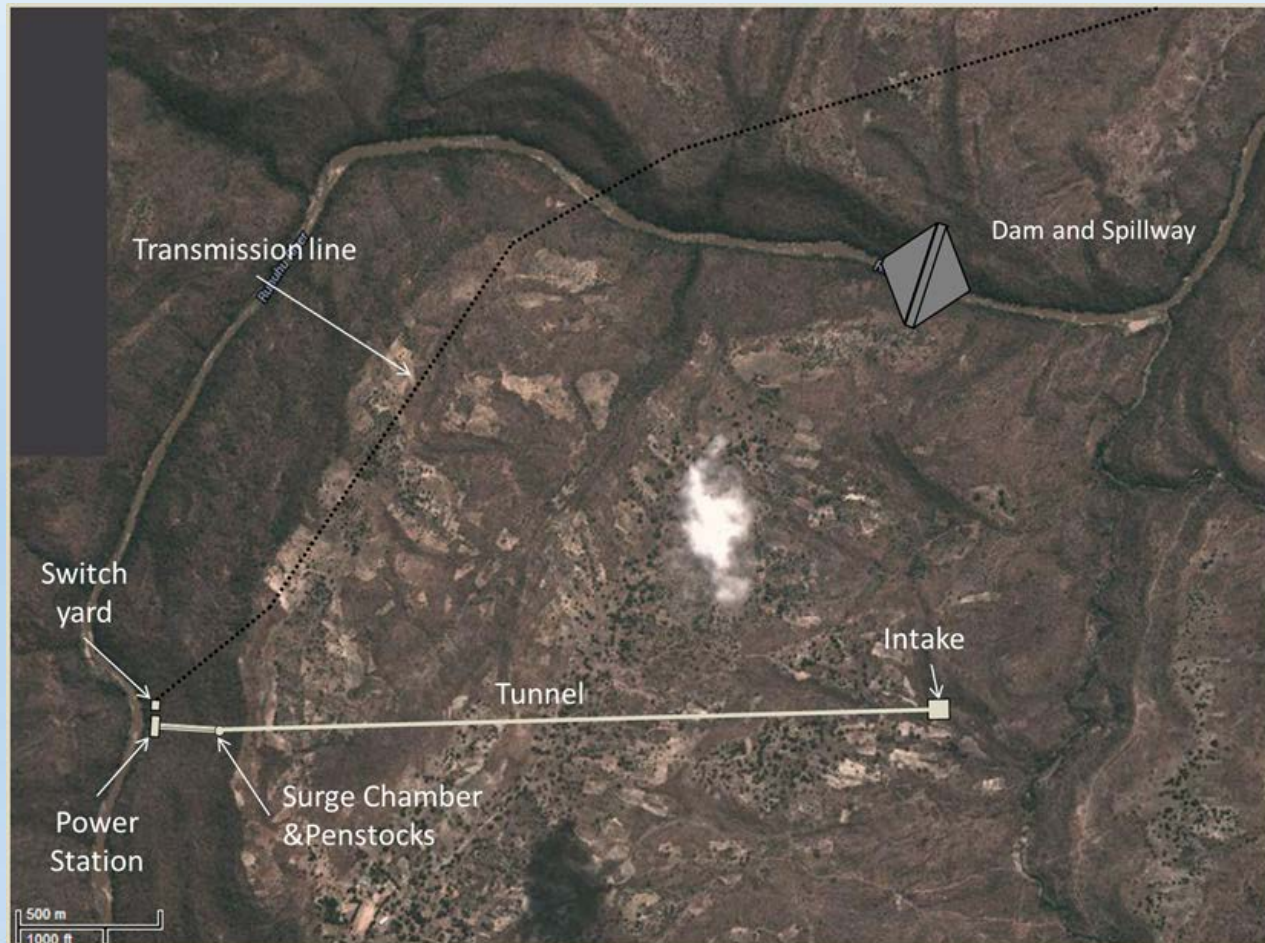
# Kikonge Hydropower Project: Plan at Dam Site



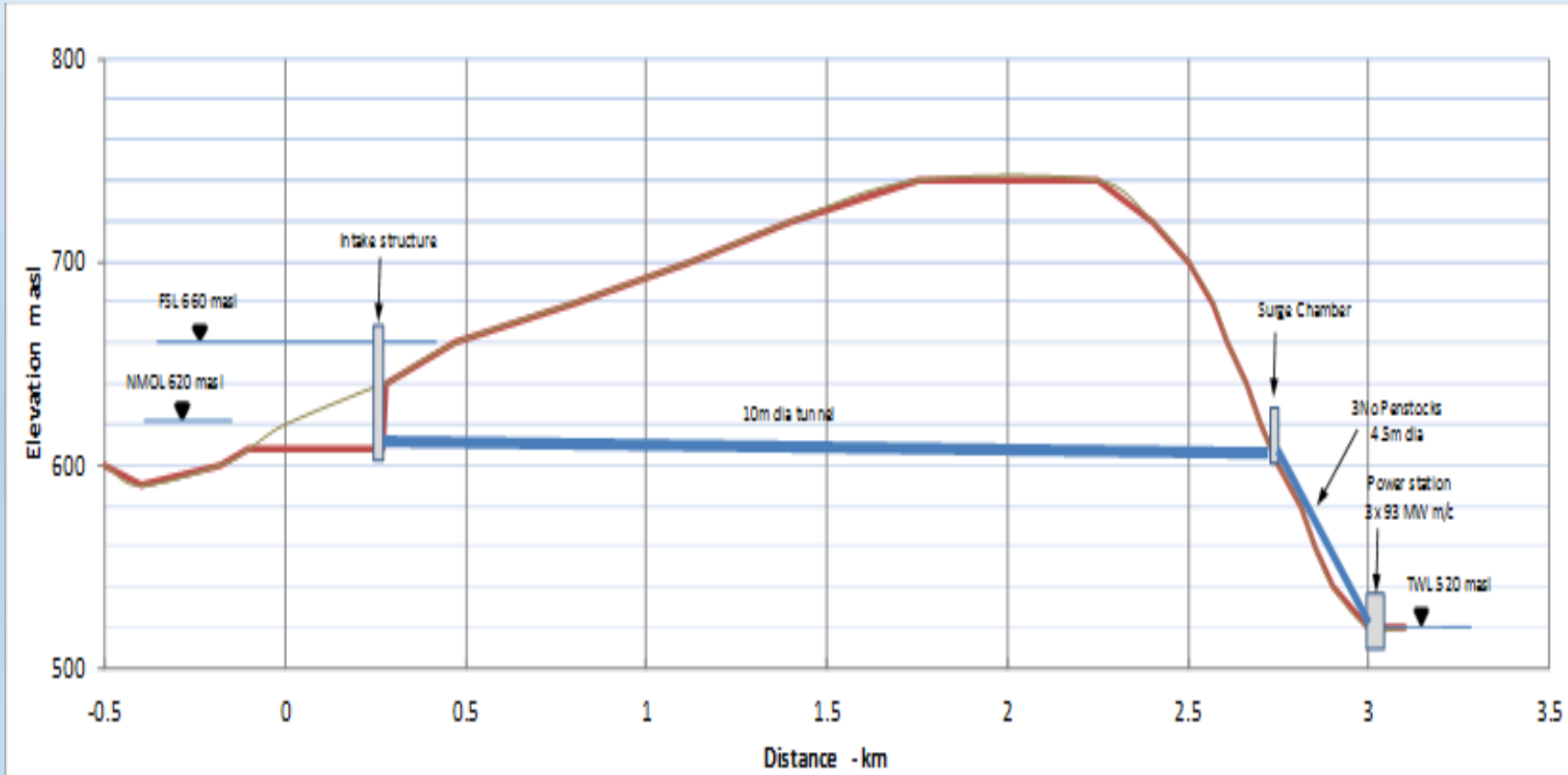
# Kikonge Hydropower Project: Valley Section at Dam Site



# Kikonge Hydropower Project: Layout



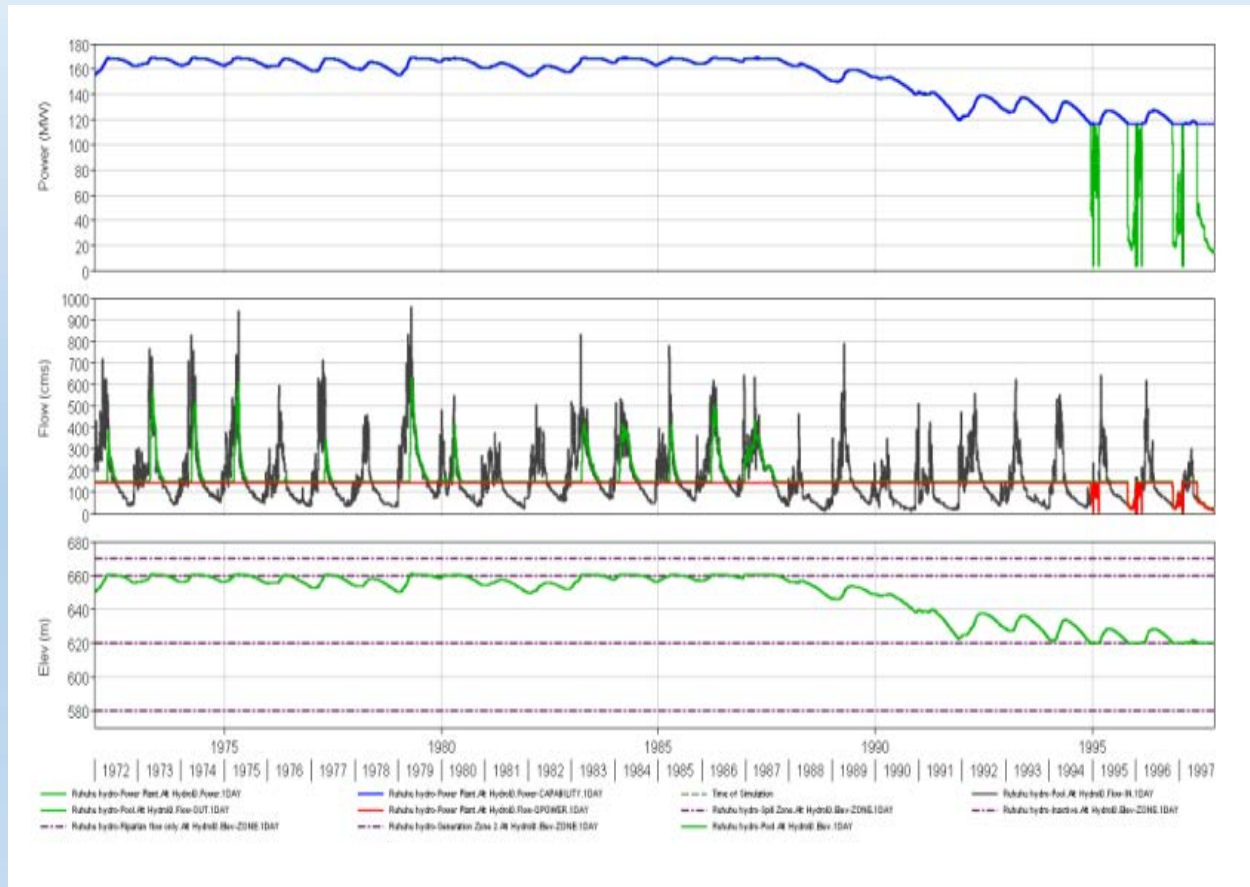
# Kikonge Hydropower Project: Section through Power Waterway





# Kikonge Hydropower Project

- Reservoir operation simulation using ResSim software

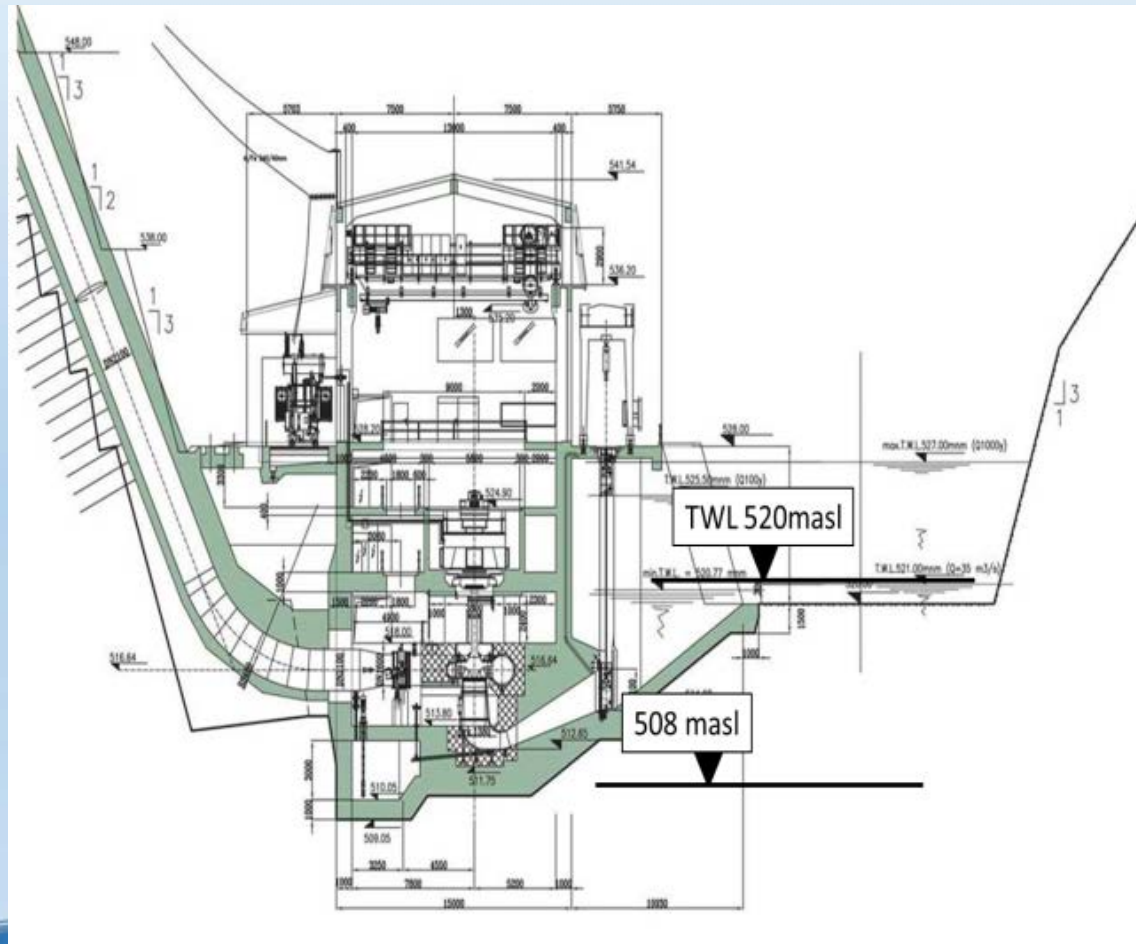


# Kikonge Hydropower Project: Summary of Reservoir Simulation Results

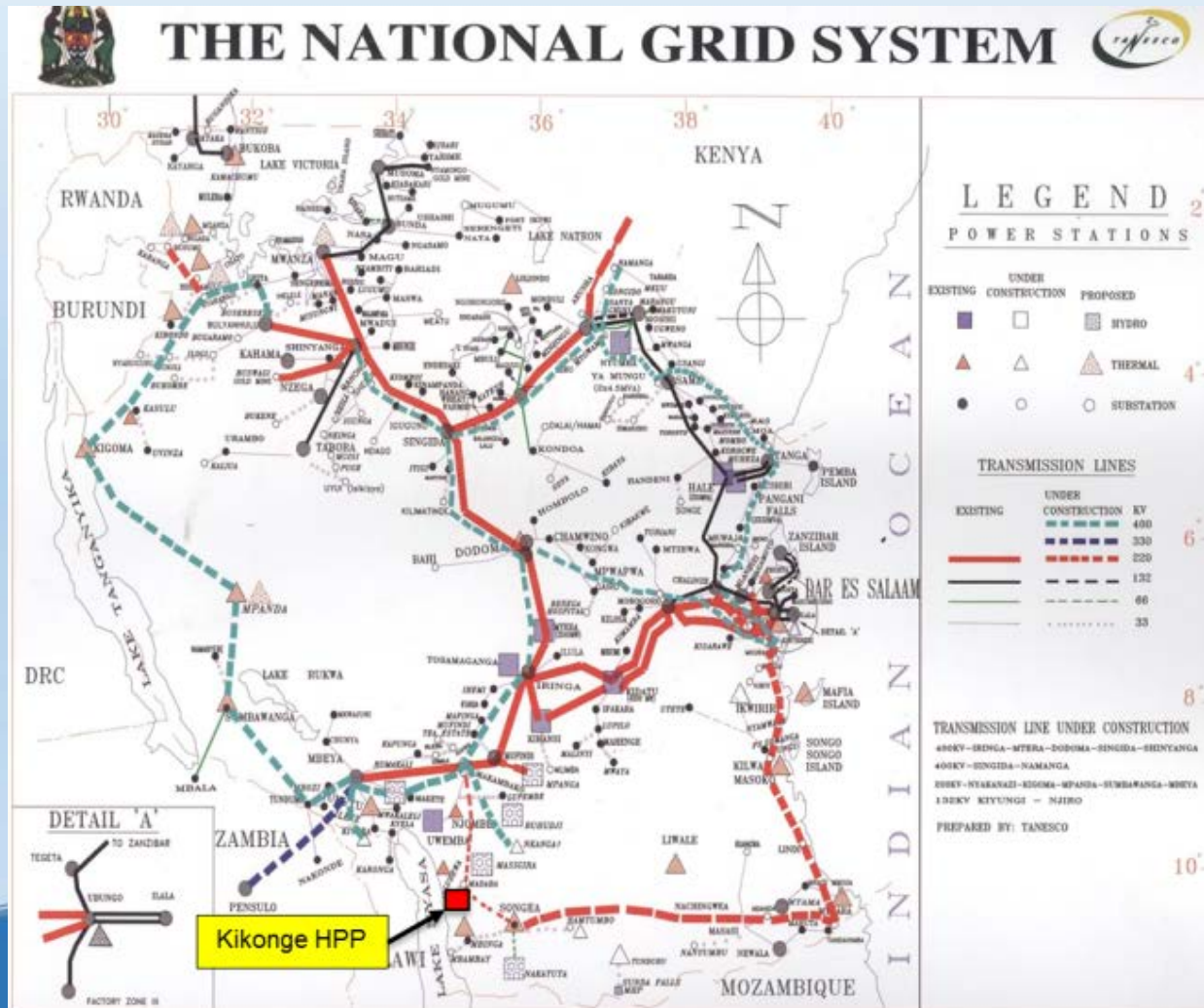
Dam Height	FSL	NMOL	TWL	Ave Head	Active Storage	Ave Dam inflow	Active Storage/ inflow	Station Capacity	Units	Spill	Annual Generation
m	masl	masl	masl	m	MCM	m <sup>3</sup> /s	vol/vol	MW	#	%	GWh
140	680	640	520	140	11000	150	2.32	330	3	4%	1572
120	660	620	520	120	6200	150	1.31	300	3	4%	1268
100	640	610	520	105	3000	150	0.63	250	3	14%	1056



# Typical Cross-Section of a Power Station



# Kikonge Hydropower Project: Transmission Connection to Makambako



# Kikonge Hydropower Project: Environmental and Social Impacts

- 💧 Inundation of some 7400 ha (for FSL 660 masl).
- 💧 Population displacement (numbers of affected persons not known at present).
- 💧 Reduction of level of Lake Nyasa by some 330 mm as Kikonge reservoir fills.
- 💧 Reduction of sediment deposition in Ruhuhu delta and Lake Nyasa.
- 💧 Barrier to fish migration to upper reaches of Ruhuhu river.



# Kikonge Hydropower Project: Estimated Costs

Item	Amount USD millions
Site Establishment - P&G	34.00
Intake Structure	13.21
Headrace Tunnel	30.32
Surge Shaft	3.97
Penstocks	24.42
Power Station - Civil Works	20.24
Power Station - M&E	144.90
Switchyard/Transformers/Transmission	101.67
Environmental and Social Management	5.00
Sub-total	377.73
Engineering and Project Management 8%	30.22
Contingency 20%	81.59
Total for Power Scheme	489.54
Dam (FSL 660masl)	262.00
Roads	15.00
<b>GRAND TOTAL</b>	<b>766.54</b>



# Kikonge Hydropower Project: Economic Parameters

💧 IRR	12.4%
💧 Benefit : Cost Ratio	1.22
💧 Net Benefits	USD 123.6 million
💧 Levelised Cost	USc 5.0 / kWh



# Kikonge Hydropower Project: Advantages

- 💧 Large storage – high energy security throughout the year.
- 💧 Can be flexibly dispatched to meet seasonal or peaking requirements of the system.
- 💧 Cost of supply likely to be competitive with other hydro and thermal alternatives.
- 💧 Connection into the existing 220kV and future 400kV grid system at Makambako.
- 💧 Does not have adverse effects on Masigira run-of-river project upstream.





# Kikonge Hydropower Project: Way Forward

- Explicit commitment on the project from MoE, Tanesco, and relevant government stakeholders.
- Collaboration with Tanesco to undertake further studies of Kikonge Hydropower Project and to identify interested potential financiers.
- Potential funding from CRIDF (British Govt overseas aid) of up to GBP 1.5 million for feasibility study.



# Kikonge Hydropower Project: Scope of CRIDF Studies

💧 To be defined in discussions with Tanesco.

💧 To include:

- Hydrological studies;
- Geological investigations;
- Engineering design;
- Environmental and social impact assessment;
- Cost estimation;
- Construction programming;
- Economic and financial analysis;
- Reporting.

