

REPÚBLICA
DE



ANGOLA

COMISSÃO TÉCNICA PERMANENTE CONJUNTA
PARA A BACIA DO RIO CUNENE
(CTPC)

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PERMANENT JOINT TECHNICAL COMMISSION
ON THE CUNENE RIVER BASIN
(PJTC)

REPUBLIC
OF



NAMIBIA

BAYNES HYDROPOWER SCHEME ON THE LOWER CUNENE

June 2009

Presentation Outline

- ❑ Purpose of Previous Studies on Epupa/Baynes 1998.
- ❑ Current Situation.
- ❑ Generation options considered
- ❑ The Baynes Study 2008
- ❑ Technical detail of Baynes Alternatives

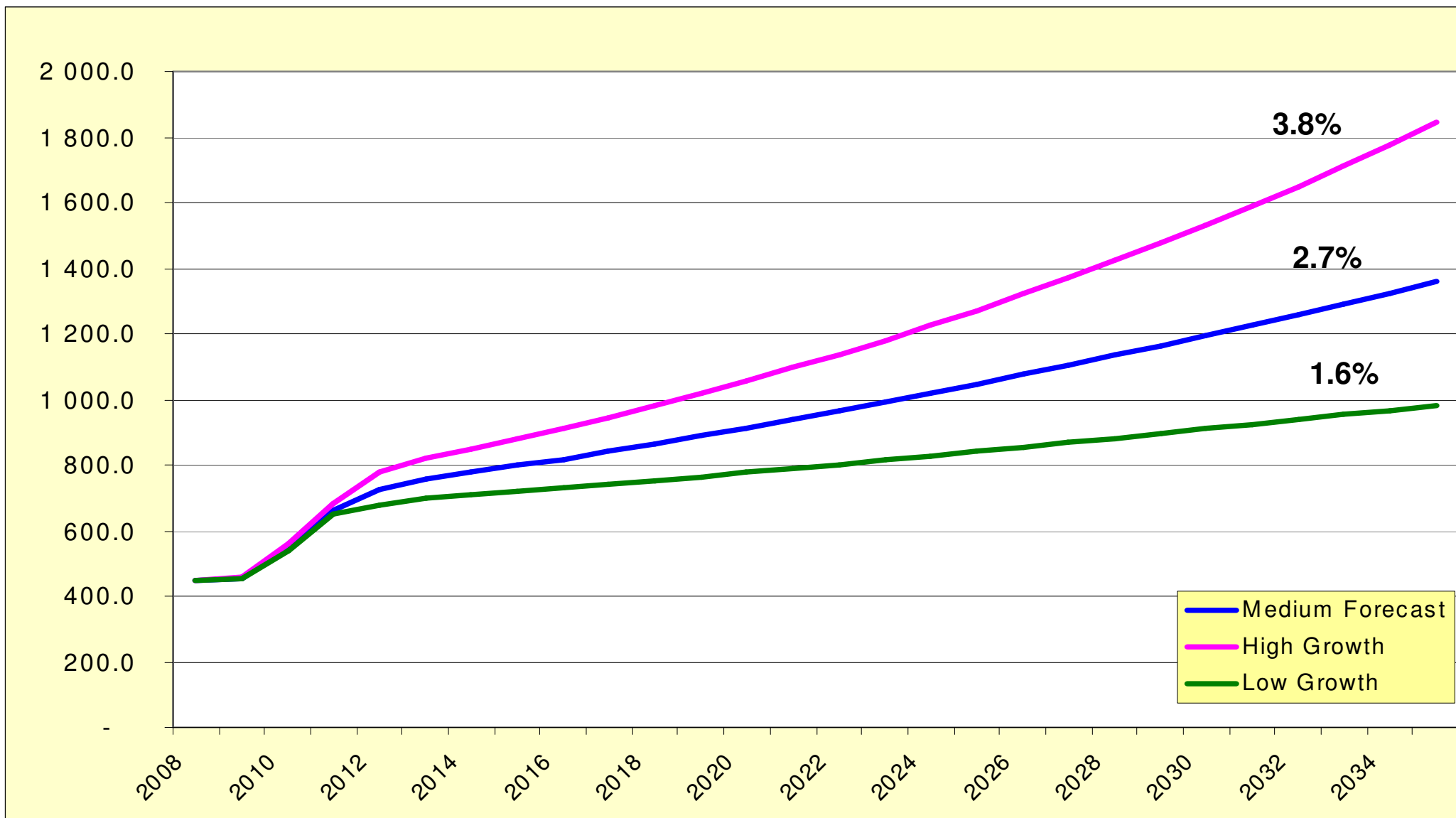
Purpose of previous studies on Epupa/Baynes 1998

- ❑ To find the most cost efficient option for self sufficiency of electricity supply to Namibia
- ❑ The governments of Angola and Namibia could not agree on which power station, Baynes or Epupa to develop.
- ❑ A 400 kV power line to SA was completed in October 2000 to cope with growing demand for electricity in Namibia since a favorable bi-lateral electricity import agreement was concluded with Eskom S A.
- ❑ This agreement however terminated in 2006.

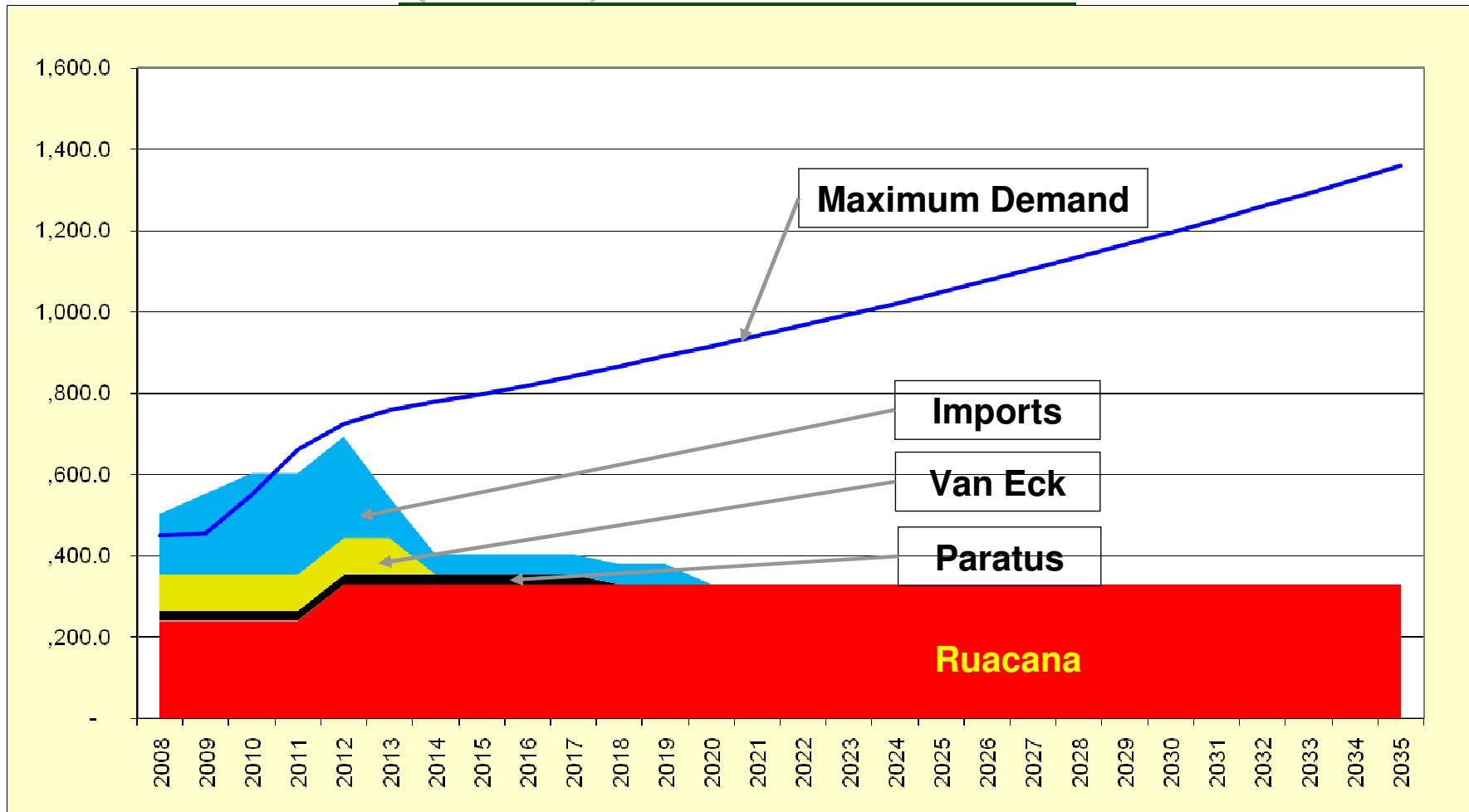
Current situation

- ❑ Eskom SA cannot supply electricity to Namibia during all load periods anymore as a result of own lack of capacity.
- ❑ The cost of electricity, if supplied from Eskom, is very high during peaking and standard periods.
- ❑ Annual growth = 4.6% on energy while peak demand growth = 0.7%
- ❑ Namibia is presently importing $\pm 80\%$ of energy consumed in some periods
- ❑ Price of electricity is expected to rise dramatically.

Energy Demand (GWh) Forecast



Maximum Demand/Supply Graph (MW) for Namibia



Current situation cont.

- ❑ Ruacana Power Station is used to service peak demand during low flow periods in the Kunene River together with imports.
- ❑ If imports are not possible or insufficient, NamPower needs to run Van Eck and Paratus Power Stations at extremely high cost.
- ❑ To increase security of supply and self sufficiency to Namibia
NamPower needs to develop a new power station.

Generation Options Considered

- ❑ Alternatives being considered by NamPower are:
 - Combined Cycle Gas-fired Power Station (Kudu) - 400 to 800 MW
 - Coal –fired Power Station at Walvis Bay - 400 MW
 - Diesel Peaking Station, Walvis Bay – ±50 MW
 - Lower Orange Small Hydro Stations -108 MW
 - Renewable energy such as wind and solar power < 40 MW
 - Baynes Hydropower Station - 360 to 550 MW (50% to each country)
- ❑ Governments of Namibia and Angola decided to jointly have another look at Baynes as a Peaking Station

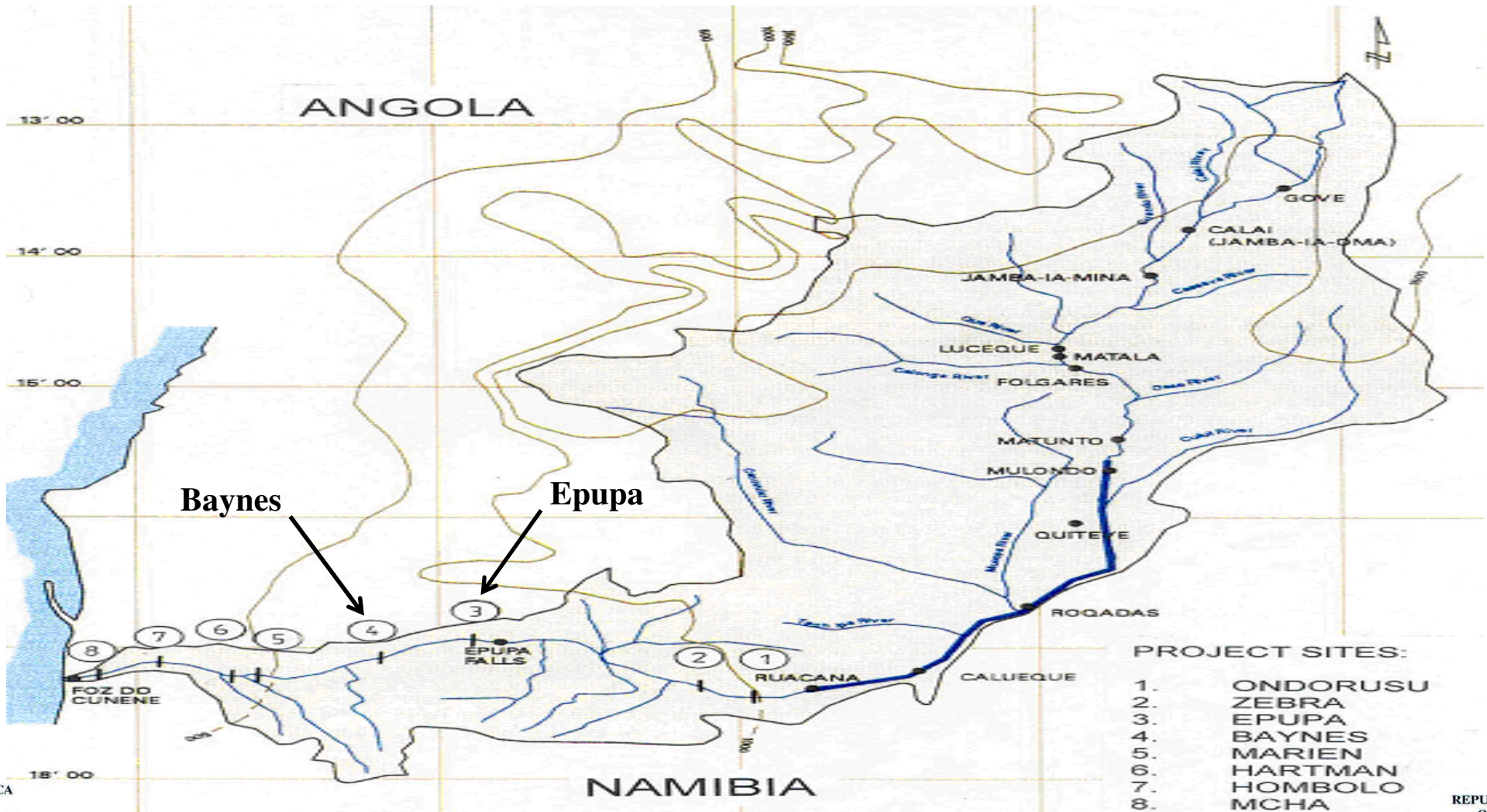
The Baynes Study 2008

- ❑ The PJTC appointed the Cunene Consortium to perform a techno-economic feasibility study on the Baynes Hydropower Project.
- ❑ A company, Environmental Resource Management (ERM) was appointed to do a separate environmental assessment of the project.
- ❑ Both studies are planned to be completed by end February 2010
- ❑ Public participation is a very important aspect of the study especially w.r.t. the directly affected parties living in the project area.

Technical details of Baynes Alternatives

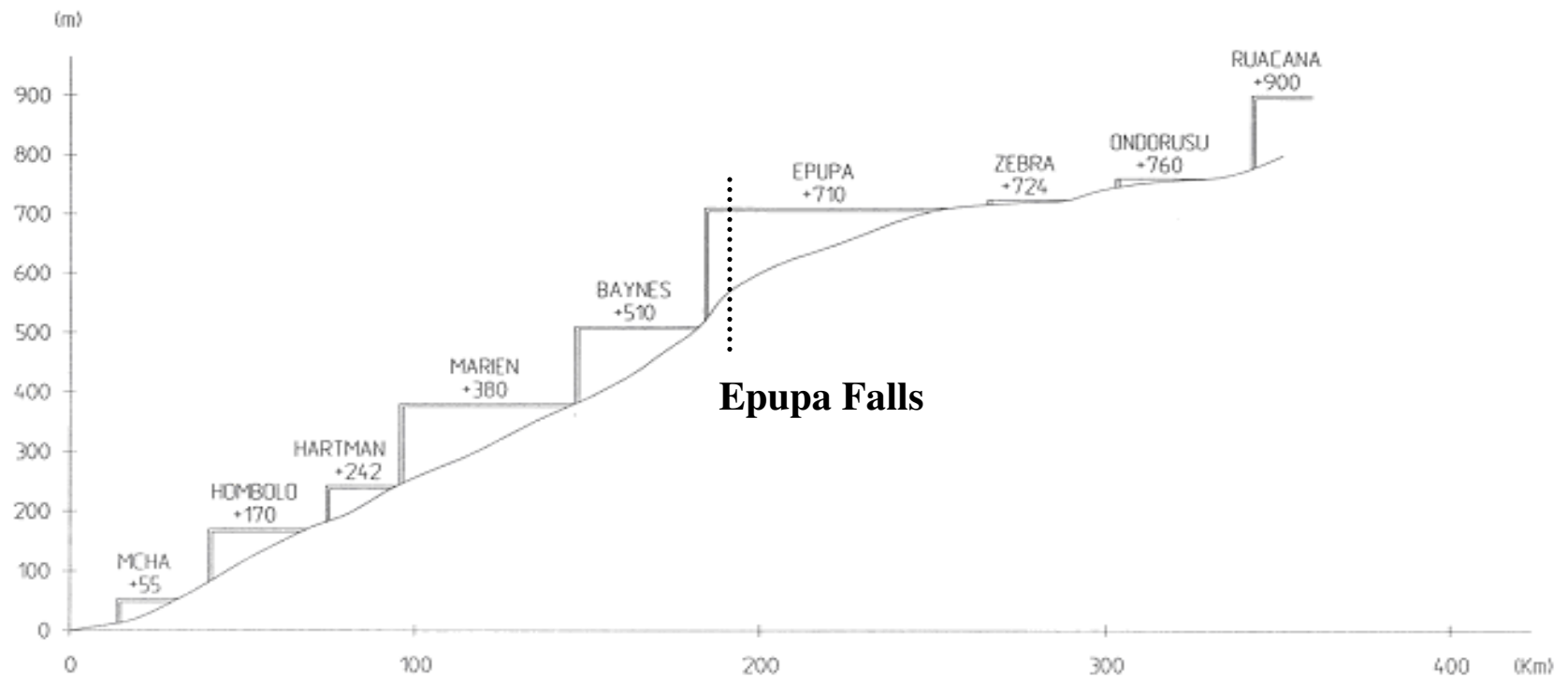
- ❑ Site location of hydro sites in Lower Cunene
- ❑ Hydro Potential-Lower Cunene.
- ❑ Why Baynes Site ?
- ❑ Baynes Alternative Dam Sites.
- ❑ Inundated Areas of the Dam Sites

Site Location



Hydro Potential – Lower Kunene

KUNENE RIVER
LONG TERM DEVELOPMENT



HYDRO POTENTIAL-LOWER KUNENE RIVER

NAME	OPERATING HEIGHT m	RESERVIROR CAPACITY Mm ³	POTENTIAL CAPACITY MW
CALUEQUE	11	2500	0
JACVALE - LUANDEGE	171	23	255
RUACANA	134	25	400
ZEBRA - ONDORUSO	65	100	135
EPUPA	160	7800	330
BAYNES	125(200*)	410(2600*)	265(360*)
MARIEN	140	800	300
HARTMAN - MCHA	201	480	425
TOTAL LOWER CUNENE			2110

Why Baynes Site?

- ❑ Epupa site was not chosen this time due to environmental considerations
- ❑ Both Angola and Namibia are keen to study the Baynes option due to its much smaller environmental impact and its suitability for peaking generation.
 - Too small storage volume for reliable base load generation
 - High Head
 - Suitable dam profile
 - Proximity to NamPower Grid
- ❑ Presently three site alternatives are being considered for dam levels 580, 560 and 520 mamsl respectively.

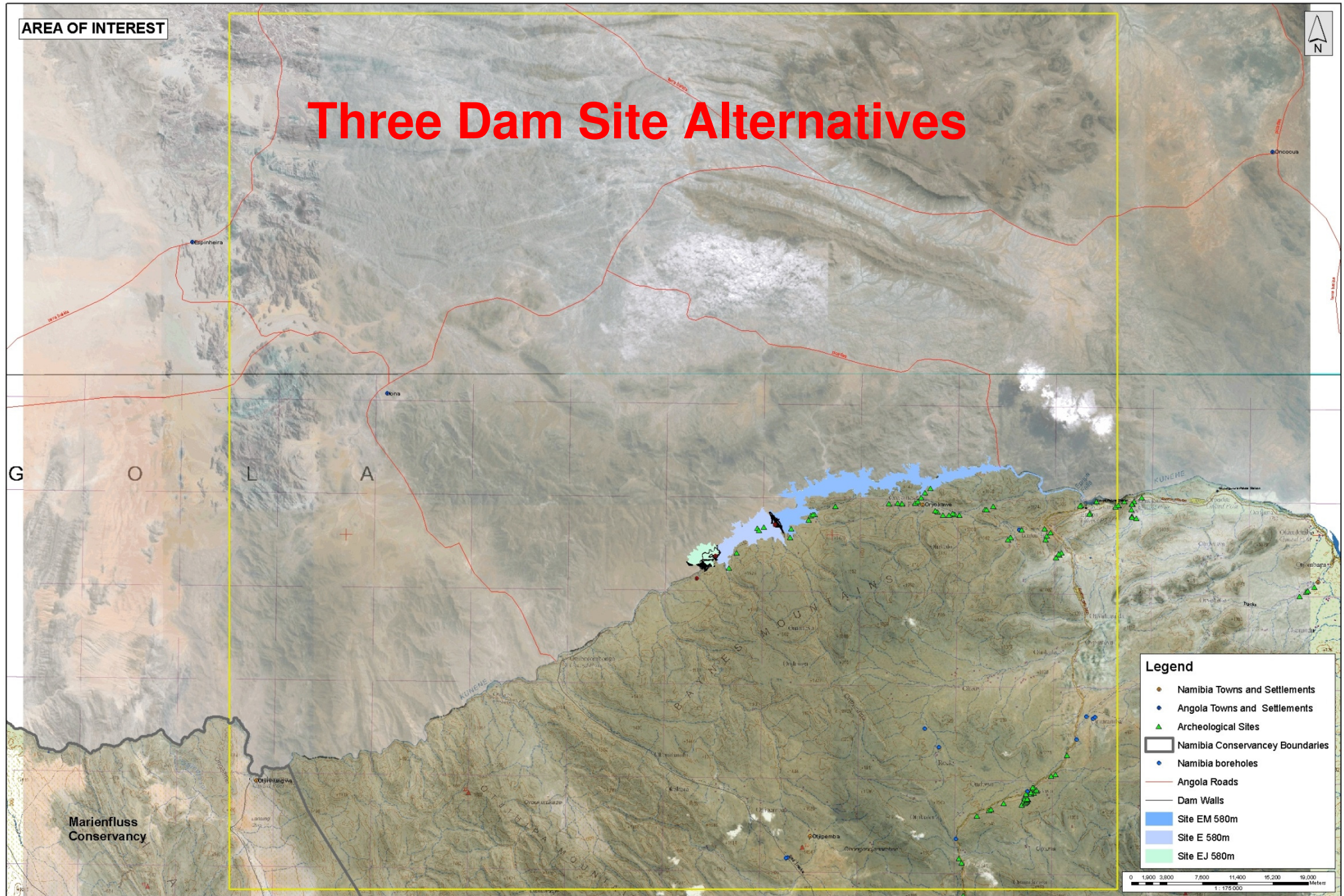
THE THREE ALTERNATIVE BAYNES DAM SITES



INUNDATED AREAS OF THE DAM SITES

AREA OF INTEREST

Three Dam Site Alternatives



Three Dam Site Alternatives

The map displays the Kunene River and surrounding terrain. Three dam site alternatives are indicated by green triangles. The map includes various geographical features and labels, such as 'KUNENE', 'Oryokawe', 'Oryokawa', and 'Oryokwa'. A red line and a yellow line are also visible on the map.

SITE EM EL



Upstream Site "Em"



Legend

- Nambila boreholes
- Dam Wall Site EM
- Site EM 580m
- Angola Roads
- Archaeological Sites

0 400 800 1200 1600 2000 2400 2800 3200 3600 4000
1:15,000

SITE E EL



Original Site "E"





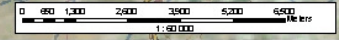
Downstream Site "Ej"

Legend

- Namibia boreholes
- Angola Roads
- Archeological Sites
- Dam Wall
- Site EJ 580m

Scale: 0 600 1200 2400 3600 4800 6000 meters

-  Namibia boreholes
-  Angola Roads
-  Archeological Sites
-  Dam Wall
-  Site EJ 580m



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Thank you!