

## SECTION 16 : CONCLUSIONS AND RECOMMENDATIONS

### 16.1 CONCLUSIONS

#### 16.1.1 TECHNICAL ASPECTS

The study has shown that there are three potential sites at which a hydro power plant could be constructed. All sites have advantages as well as disadvantages, but Site 5 has proved to be the site with the most potential in respect of power generation. Several key issues have been identified in the Preliminary Environmental Assessment report, the most important of which relate to the movement of sediment in the Okavango River which may not be disrupted, and fear that excessive inundation of islands in the weir basin may destroy unique and rare fauna and flora.

Model tests need to be undertaken to establish the most efficient, and acceptable, method to overcome the need to maintain sediment. In respect of the island issue, further detailed investigations need to be undertaken by the environmental team during the detailed feasibility study phase, before the consequences of island inundation can be properly assessed. Lower weir heights should also be looked at to ascertain the relative economic and environmental sensitivities to different full supply levels.

The proposal that a new concept of turbines, namely the Hydromatrix turbine, be used for the Popa Falls Hydro Power Project has resulted in the project becoming more viable than would otherwise have been the case. The utilisation of the Hydromatrix turbine Modules in combination with the automatic TOPS spillway gates, makes the proposed hydro power project unique and provides a technically sound and cost effective solution.

#### 16.1.2 FINANCIAL ASPECTS

The results of the financial analysis clearly show that a hydro power plant constructed at Site 5 with the sediment bypass system installed, is financially and economically the most viable of all alternatives investigated. The financial performance indicators for the preferred option are as follows:

FIRR	10,18%
FNPV	13,091 TUS\$
Benefit Cost Ratio	1,38
LUC	31,51 US\$/MWh

The economic indicators for the same site are:

EIRR	11,92%
ENPV	3,829 TUS\$
Economic Benefit/Cost Ration	1,14

## 16.2 RECOMMENDATIONS

The major objective of the study was to investigate the viability of constructing a hydro power plant in the Divundu area, which is located some 2,5 km upstream of the Popa Falls. The objective has been met with the proposal that a 9,75 m high weir be constructed at Site 5 to an elevation of 1010,0 m.a.m.s.l. which would incorporate 27 Hydromatrix turbines and 6 TOPS spillway gates. This proposal provides for pumping incoming sediments from the head of the weir basin to downstream of the weir, thereby eliminating one of the most crucial issues identified in the Preliminary Environmental Assessment.

It is therefore recommended that:

- Carry out further detailed analyses of the Hydromatrix Turbine option to establish whether these turbines are able to operate in an island mode configuration. In the event that it is found that this is not possible or remains doubtful, then the bulb turbine option should be further pursued.
- Model testing of the sediment bypass proposal and, if necessary, the alternative of the sediment sluicing proposal,
- A sediment sampling/survey programme be initiated at the start of the detailed feasibility study, the duration of which should not be less than 12 months with a total of 6 sampling trips at three-month intervals,
- Detailed geotechnical investigations, including rotary core drilling, excavation of deep test pits, laboratory tests on cores, electromagnetic surveys to determine the position of structural features, and field investigations to find suitable sources of construction materials, be carried out. Exploratory work should initially be limited to Site 5 but some additional core drilling should also be carried out at Site 4 to establish if founding conditions are similar to those found at Site 5.

In addition to a fully detailed technical feasibility study, a detailed environmental impact assessment would need to be carried out so that the impacts identified in the PEA can be better quantified to enable the technical team to incorporate appropriate cost effective ways of mitigating these impacts.