

THESIS

LAYOUT FINALIZATION FOR HYDRO ELECTRIC PROJECT FALLS ON
NARA CANAL

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By

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ABSTRACT

Nara Canal is a perennial irrigation canal that off-takes from Sukkar Barrage near Sukkar city and delivers a uniform irrigation water flow for 11 months of the year. In addition to the irrigation supplies, the local population of the project area uses water from the canal for a number of purposes like, washing and bathing.

There is a lift irrigation system in the canal system. Government and Private Tube well are installed in pumping stations for irrigation purposes because Nara canal is in cut.

There are six numbers of falls on this canal but two falls at RD 26 and RD 139 are found to be favourable for hydropower development, therefore considered for this thesis work.

A number of layouts of this Project have been studied but considering the technical and environmental problems of the project, the following two layouts were selected to carry out detailed comparison and finalization study:

Layout-A: Combination of falls at RD: 26+000

Layout-B: Combination of falls at RD: 139+000

In order to carry out the proposed study, a visit to the site was conducted and the requisite data relating to climate, hydrology, topography, sediment, structures and environment etc. collected from different Organizations.

From the collected discharge data for the year 1995 to 2005, the flow duration curves were prepared to ascertain the availability of flows. For design discharge of the studied layouts, flow of 311 m³/s and 307 m³/s for Layout-A and Layout-B respectively which were available 30% time of the year were selected.

Power potential and Energy output were evaluated for the both layouts for comparison and finalization the layout. The maximum power output for Layout-A and Layout-B was 5.5 MW and 8.11 MW respectively. The mean annual energy output for Layout-A and Layout-B was 35.5 GWh and 57.17 GWh respectively.

The cost estimation was carried out for both layouts as tabulated below.

Layout	Base Cost (M. Rs.)	IDC (M. Rs.)	Total Project Cost (M.Rs)
Layout-A	1010.942	94.300	1105.242
Layout-B	803.428	72.220	875.648

Economic and Financial analysis of the both layouts were also carried out. The results of which are given below:

Layout	Economic Analysis		Financial Analysis		Cost per KWh and KW	
	IERR (%)	B/C Ratio	IFRR (%)	Financial Cost	Cost per KWh	Installed cost per KW (Rs.)
Layout-A	16.33	1.27	6.41	1167.651	2.93	209001
Layout-B	34.62	2.30	15.41	925.606	1.45	112619

The Layout-B of Hydroelectric project on Nara Canal fall at RD-139+000 has less technical & environmental issues and yields better economic & financial results, therefore finalized for low cost hydel power to Sukkur District and Salih pat tehsil.