

THESIS

PLANNING & DESIGN OF HYDRO ELECTRIC POWER PROJECT  
(A CASE STUDY OF PROPOSED LOW HEAD HYDROPOWER  
PLANT AT RD 283+000 OF UPPER CHENAB CANAL)



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## ABSTRACT

Recent escalation of the cost of energy has resulted in a reawakened interest in hydroelectric power as a source of electrical energy. The economic situation now favors smaller hydropower projects, and special equipment is being developed. Techniques for making the new low head hydraulic turbines and related equipment practical and economically viable have introduced new facets to hydropower engineering.

Another influence on the planning and design for hydropower developments has been the increased public demand to assess the social and environmental impact of the construction and operation of hydropower plants. Techniques for evaluating those impacts are needed so that an authoritative display and weighing can be offered to both the decision makers and the public. This study is meant for different alternatives of the project location and powerhouse, by considering unique site conditions and challenging technical aspects. This study is aimed to establish some based line information for detailed investigation such as feasibility. In addition to the technical aspects of the project this also discusses economic analysis and environmental considerations. Throughout this study, detailed work has been done to understand the various technical approaches commonly used in making a feasibility determination for a hydropower project.

Fundamentals of hydraulics and hydrology are used to present the basic theory necessary to understand hydropower engineering. The proposed hydel scheme lies on Upper Chenab Canal Lower at RD 283 using the available discharge data of UCC for

past ten years, daily flow duration curve, hydrograph and rating curve are developed which are used to analyze and select suitable pattern for power generation, types of hydro-turbines and number of standardized of unit. The proposed layout of the study recommended is conventional powerhouse with a spillway discharge downstream of RD 283. This study also concludes on environmental impact for hydropower developments. Methodologies are presented for making the necessary evaluations to comply with legal requirements. The procedures presented fill a need for an authoritative technique to help in the design and environmental aspects of planning for potential projects. Estimated total cost of the project is Rs. 219.509 million inclusive of Rs. 62.600 million as foreign exchange compared. Internal rate of return in case of this study is 32.95%. Comparison of the results with equivalent diesel generation shows the economic viability of the project. Project is relatively marginal and very small in terms of energy contribution yet it is commended for implementation in view of acute shortage of electricity in the country at present.

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