

631  
587  
G 75

**Feasibility Study to Develop a Small Hydro Power Plant  
using Irrigation Water Release from Nillambe Oya  
Hydro Power Project**

**By**

**D.M.R.K.B Gunaratne**

A Project Report submitted in partial fulfillment

of the requirement for the

Degree of Master of Technology in Industrial Engineering

**Department of Mechanical Engineering**

**Faculty of Engineering Technology**

**The Open University of Sri Lanka**

July 2007

**68120**

## ABSTRACT

Nillambe Oya Hydro Power Project belongs to Ceylon Electricity Board, is located 12 air kilometers to the south of Kandy city in the lower reach of Nillambe Oya, in Kandy district in the Central province. It is a daily regulating diversion type hydro power plant, having generating capacity of 3.2MW with equal capacity two hydro power generators. The annual expected energy from this power plant is about 14.76 GWh. Its generated power is step-up to 33kV by the generator transformer and transmits along 33kV line, connected to the grid substation at Kiribathkumbura.

The surrounding area of this hydro power project is highly agricultural and during implementation of this hydro power project, part of the river flow, about  $0.28\text{m}^3/\text{s}$  has been diverted to Gurukale irrigation project, 2.7km upstream from the dam site and another part, about  $0.22\text{m}^3/\text{s}$  has been diverted from its forebay to the downstream area of the dam site for irrigation purposes in the areas of Godawela and Ganegoda. In addition, since 1990 this project has to release  $0.05\text{m}^3/\text{s}$  of water from its forebay for the Udunuwara drinking water project.

Therefore according to these social requirements Nillambe Hydro power plant has to allocate about  $0.57\text{m}^3/\text{s}$  for social needs continuously from this hydro source and thus it is allowed to use,  $0.85\text{m}^3/\text{s}$  flow at 80% duration for the generation of power. Based on these facts the utilization of its hydro power plants has been restricted to approximately 4,620hours per year, keeping plant factor of each machine at low value, around 30%. Releasing of water for social needs seems a significant loss

in terms of the expected energy from this hydro source. But however, according to the irrigation canal constructions, Ceylon Electricity Board can recover part of the energy it loses from the downstream irrigation release easily by establishing a system of small hydro power plants before releasing water for irrigation. Most of the civil constructions and transmission line required to develop this hydro source has been already constructed by the Nillambe Hydro Power project.

Therefore in this feasibility study attempts are made to find an optimum method to establish a system of small hydro power plant suitable to harness this hydro source. The methodology followed includes technical feasibility, cost estimation, economical feasibility and then finding an optimum method by comparing various qualitative factors of economically feasible projects by using point rating system. Since Nillambe Hydro Power Project releases water continuously for irrigation, these small hydro plants are able to enhance energy potential of the Nillambe Hydro Power Project considerably, even though they are small in terms of power capacity.