

**OPTIMIZING OF THE USAGE OF
SAMANALAWEWA WATER RESOURCES FOR
POWER GENERATION**

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Degree of Master of Science

Department of Electrical Engineering

University of Moratuwa

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Dissertation submitted in partial fulfillment of the requirements for the degree Master
of Science in Electrical Installation

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DECLARATION

“I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Date:

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The above candidate has carried out research for the Masters Dissertation under my supervision.

.....

Signature of the supervisor

Date:

(Eng. W.D. A. S. Wijayapala)

ABSTRACT

Samanalawewa hydroelectric project is based on Walawe basin in southern region of Sri Lanka. It includes Samanalawewa reservoir, a water way system and a 120MW power plant as stage (I). Some provisions have been kept for stage (II) to add another 120MW power plant to meet the peak power demand with low cost hydro power. Since the impounding of the reservoir there is a leak around $2.44\text{m}^3/\text{s}$ and past leak mitigation activities have not succeeded. The leak accounts for more than one fifth of energy loss of the current energy generation by Samanalawewa power plant. The construction of stage (II) is suspended with lower energy generation than expected.

This research discusses about a Leak Pump Back System (LPBS) which will curtail the net water outflow from the leak. The LPBS will pump back the leak water to the reservoir and this additional water input can be used to generate power by SPP. The pumping head of LPBS is much lower than the design head of SPP. Therefore The LPBS will consume lower energy than the extra energy generation by SPP. Since the pumped back water is regulated by the reservoir, the extra energy generation is dispatch-able. This will improve the viability of Samanalawewa stage (II).

Construction works for a mini hydro power plant is underway using the leaked water. This mini hydro plant can recover less than one third of energy which could have been recovered by LPBS. The LPBS will not divert total leaked water since LPBS will not operate during peak hours and downstream irrigation water demand needs to be provided with leaked water. Therefore the combined operation of mini hydro and LPBS will give more benefits, though the LPBS is going to limit the water supply to the mini hydro plant.

Key words: Samanalawewa, Leak, Pump, Peak demand, Hydro

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LIST OF ABBREVIATIONS

BHP	Brake Horse Power
CEB	Ceylon Electricity Board
CECB	Central Engineering Consultancy Bureau
dia.	Diameter
IRR	Internal Rate of Return
JICA	Japan International Corporation Agency
LPBS	Leak Water Pump Back System
MOV	Motor Operated Valve
msl	mean sea level
NWS&DB	National Water Supply and Drainage Board
O&M	Operations and Maintenance
SMHPP	Samanalawewa Mini Hydro Power Project
SPP	Samanalawewa Power Plant
WHP	Working Horse Power

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