



**DIVERSION OF DIYAWINI OYA INTO THE  
SURGE CHAMBER OF  
SAMANALA WEWA POWER STATION**

By

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in partial fulfillment of the requirements for the  
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## Abstract

Investigations of the development of hydro power in the upper Walawe river basin using the head difference of about 350 m between the two plateaus of the south eastern part of the central high lands of Sri Lanka had commenced in mid 1950's.

Several studies have been conducted since then on the possible ways of developing this potential. These studies lead to the finalization of Samanalawewa hydro power project in 1985.

The scheme envisaged the development of the potential in two stages. Under the stage I major components such as main dam, low pressure tunnel, surge chamber, a single penstock and power plant of 120MW capacity housing two generating units were to be developed. Work under stage I was completed and plant was commissioned in 1992.

Stage II of the scheme envisaged the construction of Diyawini Oya reservoir, a second penstock and an extension to the stage I power house to install two additional generating units to bring the total installed capacity of Samanalawewa hydro power project to 240MW.

According to the studies the installation of additional 120MW capacity in the second stage of the project was aimed at providing the needs of additional peaking capacity in the CEB generating system at a future date. The studies conducted in 1985 expected such requirement to be in the CEB system in early 21st century.

After completion of the wet blanketing of the reservoir to arrest the leakage which developed on the right abutment of the dam Ceylon Electricity Board wished to evaluate the feasibility of the development of stage II of the scheme in the early years of 21st century as envisaged in 1985.



In 1999, CEB requested Central Engineering Consultancy Bureau to review the feasibility of implementing the stage II of Samanalawewa hydro power project. During this review the capacity of the existing system to cater for the conditions after the installation of additional units the feasibility of construction of Diyawini Oya reservoir and the installed capacity to be developed in the near future were evaluated. Most of components of the existing project are found to have sufficient capacity to cater for the increased flows after stage II . Some modifications are required in the surge chamber in order to connect the Intake from the Diyawini oya reservoir. A provision has already been made available for this purpose in the surge chamber.

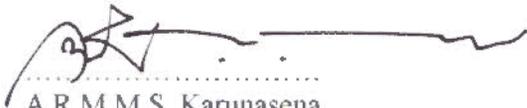
Review of the feasibility of the development of Diyawini reservoir by CECB indicated that the water tightness of the reservoir is uncertain in the light of the latest geological information available .It was also noted that any treatment of reservoir to improve the water tightness will be prohibitively costly. Accordingly CEB apparently had given up the proceeding of stage II studies.

However it was interesting to investigate the possibility of using Diyawini Oya waters diverted in the direction of the surge chamber and released in to the surge chamber at a feasible point. This way additional water quantity from the stream can be pumped in to the surge chamber and it is added to generate electricity at the power station. It is very important to check the electrical energy loss when pumping such a quantity of water and then compared with the energy gain at the end. All relevant calculations were done and it indicates that the project is well profitable and impacts on Environmental and social aspects are in favor of the project.

DECLARATION

To the best of my knowledge and belief, the work included in this thesis in part or in whole has not been submitted for any other academic qualification at any institution.

Signed by :



.....  
A.R.M.M.S. Karunasena

Certified by :

***UOM Verified Signature***



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## Preface

This is a thesis on a specific project called "Diversion of Diyawini oya in to the surge chamber of Samanalawewa Power Station" carried out by me for partial fulfilment of Master of Engineering Degree (Electrical) at University of Moratuwa.

Review of the feasibility study of the development of Diyawini reservoir carried out by Central Engineering Consultancy Bureau in the year 2000, indicated that the water tightness of the reservoir is uncertain in the light of the latest geological information available. It was also noted that any treatment of reservoir to improve the water tightness will be prohibitively costly. Beside this ,energy gains of about 23 Gwh due to the addition of Diyawini reservoir is not economical compared to the cost of development .

Hence it was the intention of me to further study about the above mentioned Diyawini oya stream and construct a pump intake and divert as much flow as possible to the surge chamber while fulfilling down stream requirement of the people living . Also to ascertain the financial and social benefits that could be gained by Ceylon Electricity Board as well as the farmer community at the down stream and to evaluate any impacts in terms of social and environmental issues.

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Samanalawewa Power Station.

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**Mr. Kamal Laksiri** is one of the Chief Civil Engineers attached to CEB and presently working in the Kukule Hydro Power Station to whom. all critical civil design matters were referred and spending his precious time to help me in making this thesis a successful one .

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**The International Centre for Hydro Power – Norway** for selecting my paper on this project and inviting me to the international seminar held in Aruza in Tanzania in August 2003.

**The Institution Of Engineers –Sri Lanka** for giving me an opportunity to make a presentation on this project for 97<sup>th</sup> Annual session of Young members section on 24<sup>th</sup> October 2003.

**All the farmers in the Surge Chamber Area** for providing me their information during the interviews in all possible ways.

## List of Figures

Figure 1.2(a):	Map of Samanala Wewa Reservoir	1
Figure 1.2(b):	Schematic representation of Samanala Wewa Reservoir	1
Figure 2(a):	Location Map	4
Figure 2(b):	Cross section of surge chamber and Diyawini oya	5
Figure 4.3 (a):	Observed stream flows (2002/2003)	10
Figure 5(a):	Location Map	12
Figure 7.1(a):	Schematic top view of the location of the project	16
Figure 7.1(b):	Schematic side view of the location of the project	17
Figure 7.1(c):	GPS measuring points	17
Figure 7.2(a):	Shortest way between Intake and surge chamber	18
Figure 7.2(b):	Shortest way up the hill	18
Figure 7.3(a):	Pipe connection under the ground level of surge chamber	18
Figure 7.3(b):	Pipe connection just above the ground level of surge chamber	19
Figure 7.3(c):	Pipe connection over the surge chamber	19
Figure 7.4(a):	Variation of surge level with reservoir water level	21
Figure 7.4(b):	Variation of reservoir water levels from 1992-2002	22
Figure 9.1(a) .	A centrifugal pump (left) and an axial pump (right).	26
Figure 9.3(a) :	Net energy gain and saving for different flow rates	28
Figure 9.3 (b) :	Combined performance curves	30
Figure 9.3 (c) :	Performance curves for different speeds	32
Figure 10.1(a):	Dimensions of existing weir.	36
Figure 10.1(b) :	Front, side elevation and plan of proposed structure.	37
Figure 10.1(c) :	Side elevation and plan of Proposed pump Intake Building	38
Figure 10.2(a):	Sectional view of weir	34
Figure 10.2 (b) :	Weir calibration curve	35
Figure 11 (a) :	Schematic diagram of control panel	41
Figure 11 (b) :	Pump control circuit no 1	42
Figure 11 (c) :	Pump control circuit no 2	43
Figure 11 (d) :	Existing supervisory control system	44
 <b>APPENDIX H</b>		
Figure 8(a) :	Moody diagram	66
 <b>APPENDIX K</b>		
Figure 9 (a)	Pump performance curves for 200 l/s pump	69
Figure 9 (b)	Pump performance curves for 680 l/s pump	70
 <b>APPENDIX M</b>		
Figure 10	Flood hydrograph	79

## List of Tables

Table 4.1(a):	Mean values of rain fall and temperature	7
Table 4.3(a):	Observed stream flows in l/s	9
Table 4.4(a):	Comparison of previous stream flow studies	11
Table 6(a):	Flow available for pumping in m <sup>3</sup> /s	15
Table 7.1(a):	GPS measurements	7
Table 7.2(a):	Length of the routes	18
Table 8(a):	Absolute roughness values of selected pipe materials	24
Table 9.3(a):	Pump capacities	29
Table 9.3(b):	Performance curves and load curve data	29
Table 9.3(c):	Combinations of pumps	30
Table 9.3(d):	Performance curve data for different speeds	31
Table 9.3(e):	Energy required for single pump with VSD	33
Table 11(a):	Pump combinations	39
Table 11(b):	Floater fixing levels	40
Table 12(a):	Flow available for pumping	45
Table 12(b):	Total energy gain with pump operated in parallel	46
Table 12(c):	Total energy gain with single pump with a VSD	47
Table 13.1(a):	Total cost for the project (case 1)	48
Table 13.2(a):	Cost analysis for the project (case 1)	49
Table 13.3(a):	Total cost for the project (case 2)	50
Table 13.4(a):	Cost analysis for the project (case 2)	51
<b>APPENDIX B</b>		
Table 4 (a):	Average monthly rain fall figures	60
<b>APPENDIX C</b>		
Table 4 (a):	Temperature recorded in the area	61
<b>APPENDIX D</b>		
Table 4 (b):	Hydrological calculations	62
<b>APPENDIX E</b>		
Table 5 (a):	Interview results area S2-S3 (left bank)	63
Table 5 (b):	Interview results area S2-S3 (right bank)	63
Table 5 (c):	Interview results area S3-S4	63
<b>APPENDIX G</b>		
Table 7 (a):	Variations of surge levels	64
<b>APPENDIX</b>		
Table 7 (a):	Monthly average reservoir water level	65
<b>APPENDIX I</b>		
Table 7 (a):	Friction calculations	67
<b>APPENDIX J</b>		
Table 7 (a):	Pump data	68



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**APPENDIX L**

Table 12 (a):	Flow data	71
Table 12 (b):	Energy	71
Table 12 (c):	Pump capacities	72
Table 12 (d):	Energy for pumps	72
Table 12 (e):	Cost saving	73

**APPENDIX N**

Table 7 (a):	Weir calibration data	74
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**APPENDIX P**

Photograph 1 :	Cylinders for measuring flows	75
Photograph 2 :	Interviewing of farmers	75
Photograph 3 :	Proposed site for the pump intake	76
Photograph 4 :	Down stream flow	76
Photograph 5 :	Existing structure	77
Photograph 6:	Surge chamber	77
Photograph 7 :	Access road to the pump intake	78



### List Of Symbols

$\Delta p$	pressure difference	[Pa] or [bar]
D	diameter	[m] or [mm]
f	friction factor	
g	gravitation	[m/s <sup>2</sup> ]
h	head	[m]
L	length	[m]
Q	flow rate	[m <sup>3</sup> /s]
Re	Reynolds number	
v	velocity	[m/s]
$\mu$	viscosity	[Ns/m <sup>2</sup> ]
$\pi$	3.1415	
$\rho$	density	[kg/m <sup>3</sup> ]
U	Evapotranspiration	[mm]
k	Coefficient of monthly consumption by vegetation	
P	Monthly percentage of day time hours of the year	
C	Coefficient of runoff	
i	Intensity of rain fall	[mm/hr]
A	Catchment area	[sqkm]
Z	Upsurge level	[m]
B	Width of the weir	[m]



## Table of Contents

Declaration	i
Preface	ii
Abstract	iii
Acknowledgement	iv
List of figures	v
List of Tables	vi
List of symbols	viii
<b>Chapter 1-Introduction</b>	<b>1</b>
1.1 Samanalawewa Power Station	1
1.2 Samanalawewa Reservoir	1
1.3 Samanalawewa Intake	2
1.4 Samanalawewa Power Tunnel	2
1.5 Samanalawewa Surge Chamber	3
1.6 Development of second stage proposals	3
1.7 Review of previous studies	3
<b>Chapter 2-Description of Diyawini Oya and its surroundings</b>	<b>4</b>
<b>Chapter 3-Research Questions</b>	<b>6</b>
<b>Chapter 5-Flow Calculations</b>	<b>7</b>
4.1 Calculation of flow using past data	7
4.2 Calculation to find maximum flow	8
4.3 Calculation of flow with observed data	9
4.4 Comparison with data obtained from previous studies	11
<b>Chapter 5-Down Stream Water Requirement</b>	<b>12</b>
5.1 Location map	12
5.2 Results of Interviews	12
5.3 Water use	13
<b>Chapter 6-Calculation of available flow for pumping</b>	<b>15</b>
<b>Chapter 7-Design of pipe route and connection at the surge chamber</b>	<b>16</b>
7.1 GPS Measurements	16
7.2 Route Options	18
7.3 Options of pipe connections at the surge chamber	18
7.4 Best design for connection at the surge chamber	19
<b>Chapter 8-Design of pipe line</b>	<b>23</b>
<b>Chapter 9-Selections of pumps</b>	<b>26</b>
9.1 Types of pumps	26
9.2 Pump combination	26
9.3 Requirement for the pumps	27
<b>Chapter 10-Design of Weir and Pump Intake</b>	<b>34</b>
10.1 Design of weir	34
10.2 Calibration of water height over the weir	35



<b>Chapter 11-Design of pump control center</b>	39
<b>Chapter 12-Energy calculations</b>	45
<b>Chapter 13-Cost and Benefit calculations</b>	48
13.1 Total cost for the project (case 1)	48
13.2 Operational Analysis (case 1)	49
13.3 Total cost for the project(case 2)	50
13.4 2Operational Analysis (case 2)	51
<b>Chapter 14-Requirement of other facilities</b>	52
14.1 Electricity Supply	52
14.2 Control cable for data transmission	52
14.3 Construction of access road	52
14.4 Construction of pump intake building	52
14.5 Surge chamber modification	52
<b>Chapter 15-Environment and Social Impacts</b>	54
15.1 Environmental Impacts	54
15.2 Social Impacts	55
<b>Chapter 16-Conclusion</b>	56
<b>Chapter 17-Recommendations</b>	57
<b>References</b>	58
<b>Appendices</b>	
A-Project Layout	59
B-Rain fall Data (1918-1998)	60
C-Temperatures recorded in the Area	61
D-Hydrological calculations	62
E-Details of Interviews	63
F-Variation of Surge levels	64
G-Reservoir water level (1992-2002)	65
H-Moody Diagram	66
I Friction calculations	67
J -Pump data	68
K- Performance curves of pumps	69
L- Calculation of energy gain with different flows	71
M-Flood Hydrograph	79
N-Weir calibration Data	75
P- Photographs	76

