

Study of water transmission line from River Nile at Atbara to Port Sudan and utilize of hydraulic energy

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**A research submitted in partial fulfilment of the Requirements for the Degree
of Master of Science in Mechanical Engineering**

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February 2021

Dedications

This research is dedicated to my FAMILY, my ADVISORS, and all my FRIENDS. Thank you all for your constant support and love in the past, present and future. Words cannot express my gratitude to all of you.

Acknowledgments

- I would like to acknowledge and thank Red Sea University, faculty of engineering teaching staff for allowing me to conduct my master degree in their esteemed university.
- I wish to thank my supervisor who was more than generous with his experience and precious time.
- Special thanks go to the National Water Corporation in Port Sudan city for allowing me to introduce on their Projects and providing any assistance requested.

Abstract

Drinking water is considered one of most essential commodities for human consumption, as well as water is the elixir for life. Adequate supply of potable safe water is absolutely essential and is the basic need for all human being on the earth.

This thesis prepared to improve the previous study by using close system transmission pipeline and extend the term of the study to year 2050 through which reducing the number of booster pumps and avail the elevation between Summit (912m) to Port Sudan (0 m) to generate electrical power by using hydraulic turbine, hence reducing the capital cost of the project. The methods have been used in present work are four different designs for water supply and hydro power generation. The results showed that: the design2 and design4 are the best compared to the other designs.

In design 2 using 1.4 m diameter will be the best design to implement capable to supply the average demand flow rate until year 2030 using only the main pump, after that adding one booster pump for year 2050. In design (4) twin pipeline each one has 1m diameter will be used, with one main pump and 2 boosters pumps to transport the half of demand flow rate of water. However, design4 is considered the second selection after design2, in this case one of these lines will transmit the water to facing the demand and the other will be standby until Year 2035. The hydro power generation started from location of Summite as the highest elevation of transmission line. The difference in the head to hydro turbine location is about 866.4m. The overall efficiency of unit selected and pipe line friction loses estimated to be 75%. The maximum power produced 16.97 MW, obtained in Year 2050 due to the increasing of water flow rate.

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