FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF WATER RESOURCES ENGINEERING

OPTIMISATION TOOLBOX FOR PLACEMENT OF ISOLATION VALVES IN A WATER DISTRIBUTION NETWORK.

BY

EKIT DINAH

REVISED SECTIONS

Panel comments and suggestions were taken into account upon revision of the final year proposal report

Response to comments

1. **Results for objective three were not yet ready**
   The results of objective three are on page…

2. **Missing conclusions**

   Conclusion is on page **…**

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DECLARATION

I Ekit Dinah declare that all the material portrayed in this project proposal report is original and has never been submitted in for award of any degree, certificate or diploma to any university or institution of higher learning.

DATE

……

SIGNATURE

…….

APPROVAL

This is to certify that the project proposal has been carried out under supervision and this report is ready for submission to the Board of Examiners and senate of Busitema University.

Mr. MASERUKA BENEDICTO

SIGNATURE:

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ABSTRACT

In a water distribution system, valves are essential for flow control and subsystem isolation. To repair one of them, subsystem isolation is necessary, which can be accomplished by shutting down nearby valves. The idea of "Segment" is required to assess the function of valves. When a pipe fails, nearby valves are closed to isolate the nodes and pipes that make up a segment from one another. The identification of segments in a water distribution system using an effective algorithm is suggested. Additionally, isolating a segment may result in the segment isolation cutting off another subsystem from water sources. It is an unintentional topological separation. A water distribution system's dependability is increased by strategically placing valves.

Keywords: Water Distribution Network (WDN); valves; segments; pipes

Background

Valves play a major role in the subsystem isolation and flow or pressure control in the water distribution system. Subsystem isolation is required to repair or rehabilitate broken components in the water distribution network to minimize water loss caused by leakage by closing adjacent valves. A significant amount of water is lost (non-revenue water) in the supply system majorly due to water leakage that have been a major problem for many regions around the world. In some countries water loss due to leakage in the supply network exceeds 40% of the water in the supply system Aburawe (2019). Reduction of water leakage is therefore an important goal for countries as it will mean a reduction in the amount of money and energy required on producing and pumping water and also satisfaction of the customers' needs through improved reliability.

Reliability in this context refers to a distribution system's capacity to meet customers' water demands in a variety of scenarios throughout the course of its useful life, both quantitatively and qualitatively. Failure scenarios related to hydraulic factors for example variations in water demand, a reduction in pipe conveyance due to aging and mechanical factors such as failure of pipes, pumps, and valves and their removal from service during routine and non-routine maintenance are seen as particularly detrimental among the various scenarios.

The installation of isolation valves has proven to be more effective in improving system reliability in relation to system failures especially the mechanical failures (Shuang et al., 2017). These valves separate the section of the distribution network (segment) that contains the pipe that requires maintenance or replacement, preventing service interruptions over the entire network or across a sizable piece of it (Santonastaso et al, 2019). Avoiding unintended disconnections, which may result from a segment's isolation when a portion of the network is fed solely through the segment in question, is crucial when segmenting a network. Numerous research on the identification of the segments and unintended disconnections that happen after a set of isolation valves has been closed have been published in the literature and some include (Balekelayi et al 2020).With segments considered as nodes and valves as links, the approaches further refined for Water GEMS (Bentley Systems 2017) are based on a dual representation of the network. The method described by (Santonastaso et al., 2019) in contrast, is based on the use of topological incidence matrixes, which have been correctly adapted to account for the pipelines in which the isolation valves are closed. A technique for the ideal positioning of isolation valves was just

Recommendations

I recommend the addition a hydraulic simulation process

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