

Bringing quality
to the
built environment

WARP - Water Renewal Planner

What is it?

WARP is a decision support tool for effective planning of water main renewal. It is computer software that analyzes the historical breakage rates of water mains, projects future breakage rates, computes life-cycle costs, and generates planning scenarios. It also takes into account time-dependent effects such as climate and cathodic protection.

Who Needs It?

Utility managers need to be able to accurately quantify the structural deterioration of water mains in order to plan effectively for the renewal of water distribution systems. Forecasting the future breakage rates of water mains by identifying breakage patterns over time is an effective and inexpensive alternative to measuring the actual deterioration in a water distribution system. To do this one must (a) identify the "true" background deterioration rates of the water mains, and (b) quantify the impact of various environmental factors as well as operational strategies on future breakage rates.

How Does it Work?

WARP uses a multi-covariate exponential model to discern breakage patterns while considering time-dependent factors such as temperature (measured by the freezing index), soil moisture (measured by rainfall deficit) and cathodic protection (CP) strategies, including hotspot CP and systematic retrofit CP. Factors such as pipe characteristics and soil type are considered by using statistical techniques for grouping the water mains.

The software can project the future breakage rates of water mains based on their background aging rates. It can also test the impact of operational strategies such as varying schedules of cathodic protection (both hotspot and retrofit) and of pipe replacement. It can then evaluate the life cycle costs of various operational scenarios and fine-tune them to achieve maximum efficiency.

Partners

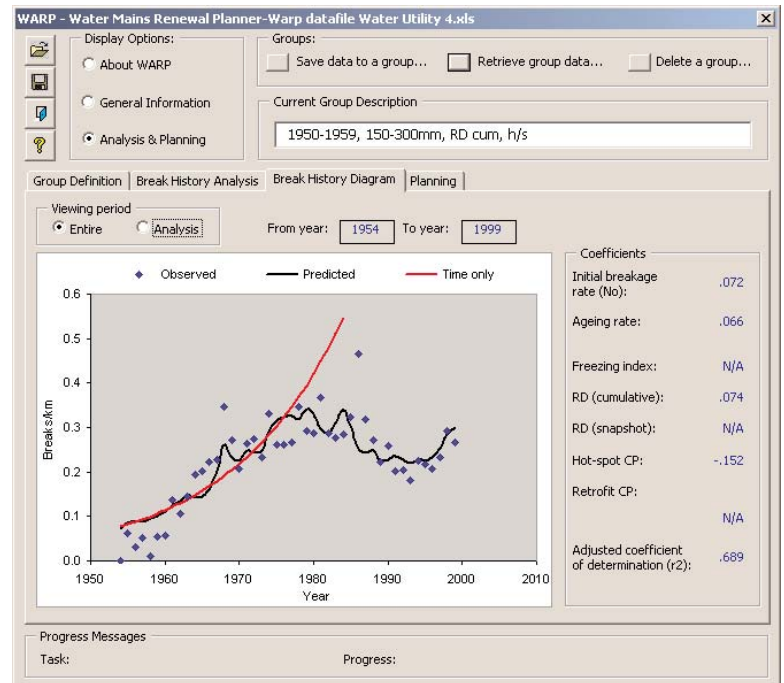
WARP was developed with the in-kind support of water utilities in Canada and the USA.

Launch Date

WARP will be available in June 2006.

Contact

Dr. Yehuda Kleiner: 613-993-3805;
Yehuda.Kleiner@nrc-cnrc.gc.ca



Breakage rate pattern of water mains with hotspot cathodic protection

For more information, see http://irc.nrc-cnrc.gc.ca/ui/bu/warp_e.html

Factsheet 28, April 2006