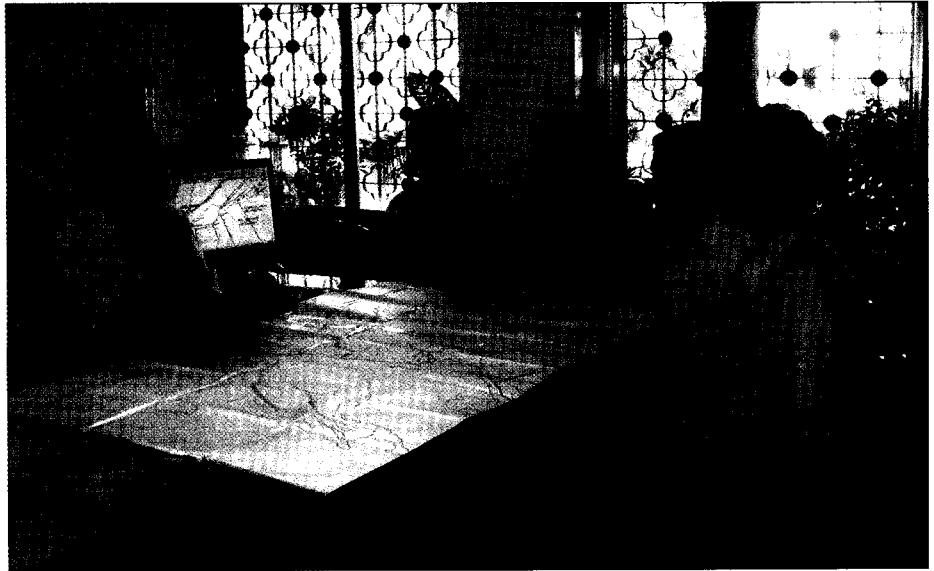


Safeguarding Water Supply in Mumbai

By Bentley Water Solutions

The Maharashtra Jeevan Pradhikaran provided adequate water supply during adverse conditions in the business capital of India, Mumbai. They designed a water distribution system to meet the deficit that arose as a result of the failure of waterworks under disaster.



The Maharashtra Jeevan Pradhikaran team designed a disaster mitigation plan to pre-empt future water supply emergencies.

Located on the west coast of India, the Mumbai metropolitan area in India regularly receives heavy rainfall during the monsoon season. The city received record-breaking rains of 944mm over a 24hr period in 2005. This deluge brought the entire area to a standstill. Roads were inundated, railway services were interrupted and the water supply from crucial utilities was disrupted.

Spread across an area of 4,355 square kilometers with a population of about 32mn, Mumbai encompasses 14 independent waterworks providing water to 13 cities; most of which were now in jeopardy. In the most adversely affected waterworks, in the suburb of Ambarnath Badlapur, the gates were washed away and the entire operation came to a halt.

In this state of emergency, an interconnection from another waterwork's pipeline passing through this area was the solution. After checking the hydraulic feasibility, the interconnections were made and the water supply was restored to a satisfactory level. In the aftermath of this calamity and all of the associated financial losses, a committee was formed to study the feasibility of interlinking the waterworks permanently. The goal was to safeguard the water supply of this economically critical region and alleviate the impact of future floods.

The Mumbai metropolitan area was chosen as the location for the study and Maharashtra Jeevan Pradhikaran was designated to create the disaster mitigation plan. Bentley Water Solutions - WaterCAD, SewerCAD, Darwin calibrator and designers were deployed

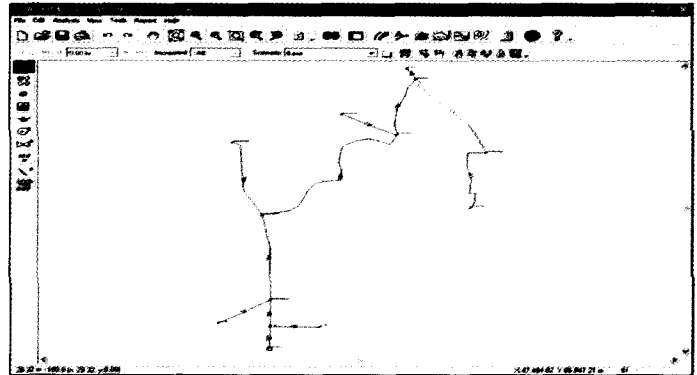
to prepare a base map of the Mumbai metropolitan region showing the key features of the current water supply system. The hydraulic model of an individual system was created on this base drawing and the hydraulic models were calibrated with respect to field pressures and flow. The water supply systems were then checked for maximum and feasible overloading conditions.

The team created various failure scenarios with each of the waterworks and identified the affected areas in terms of deficit in water supply. Various alternative interconnections were analysed to determine their ability to work as acceptable remedies for the affected areas. This involved checking the feasibility of each proposed interconnection in the field from a construction and operations standpoint.

According to Dr Sanjay Dahasahasra, Chief Engineer at the Maharashtra Jeevan Pradhikaran, "In a disaster mitigation plan, it is essential to divert water from one source that is severely affected to another. The manoeuvring of different valves was essential to stimulate nodal demands and regulation of pressures. WaterCAD provided different valves such as throttling the pressures and adjusting the flows in critical links. Knowing the hydraulic grade line of one water pipeline from which the flow is required to be diverted in the pipeline of another source, a source in the form of a reservoir of another system was stimulated."

The process of simulating disasters, anticipating challenges with remedies and managing the salvaging and interconnection of waterworks was documented and a final reference guide was created. The guide documented the approach and solutions to potential problems arising from disasters. Developing alternative interconnections and establishing their feasibility with the WaterCAD cut the design cycle time by about a year and led to savings of about \$2mn.

Dr Dahasahasra concluded that the analysis of the water distribution system was a tough and tedious job using DOS software. These tasks



The Mumbai region's water supply distribution network was schematised for analysis.

were performed by Bentley's Water Solutions using a user-friendly approach. They also provided a number of alternatives and scenarios that helped to complete a disaster mitigation plan for the Mumbai metropolitan area.

About the Contributor

The article has been compiled by Bentley Water Solutions.

For further information on the contributor, write to us at content@eawater.com

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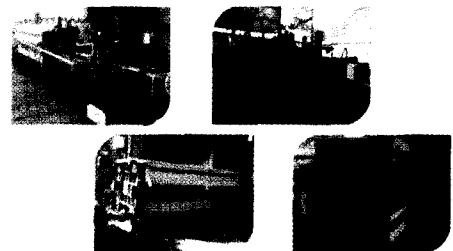
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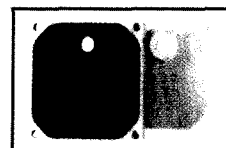
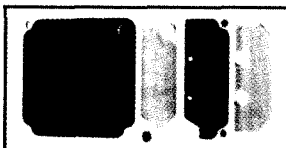
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