By Beth Ann McCoy, Murray Conn, Lar Spain, Andrew Murray

Network modeling helps Dublin reduce leakage

The regional network modeling project helped reduce leakage from 48% to 28% and better manage the water supply systems in the greater Dublin region of Ireland.

Project Engineer Pieter de Kock and Project Manager Murray Conn of McCarthy Hyder Consultants review the Dublin region model during calibration analysis.

In Ireland, the Dublin regional water project made giant strides in reducing water loss problems through metering and network management tools, including telemetry, geographical information systems (GIS), and the SynerGEE® network modeling package.

High leakage has historically plagued water supply systems in the greater Dublin area with little margin between supply capacity and demand. The water network supports a population of approximately 1.3 million, but the network featured limited district metering and lacked the modern tools necessary to efficiently manage a complex supply system. An unacceptably high level of unaccounted-for-water (UFW) at 42.5% compounded the problem.

Seven local authorities comprise the nearly 700 square miles of the greater Dublin region: Dublin City Council, Fingal County Council, Dun Laoghaire-Rathdown County Council, South Dublin County Council, Kildare County Council, Wicklow County Council and Bray Urban District Council. Each authority is responsible for its own mains maintenance. The Fingal County Council delivered the project tools on behalf of the group of councils.

In 1997, the Dublin City Council appointed McCarthy Hyder Consultants, a joint venture company between P. H. McCarthy & Partners of Ireland and Hyder Consulting in the UK, to implement a GIS and network model project for Dublin City. Following the project's success, Fingal County Council wanted to create a model for each local authority – including the Dublin city model -- and incorporate all local authority models into one regional all-mains model in order to solve UFW problems and plan for future growth. McCarthy Hyder Consultants was also selected to undertake the Dublin region network modeling project to ensure continuity between the Dublin City and regional modeling efforts.

Each local authority was separated into district meter areas (DMAs), with dedicated leakage teams established within each authority. The collection of telemetry and GIS data within each DMA was vital to the model's accuracy. Generally, a model is required to generate a DMA, however, given the project timeframe and severity of conditions, the DMAs were established before the model was developed.

The GIS fed directly into the hydraulic modeling software to expedite the model building process. McCarthy Hyder proposed the use of Advantica's Stoner Workstation Service (SWS) and its successor, SynerGEE®, as the optimal modeling solution during the Dublin City project. Fingal County Council specified that SynerGEE would be used as the network modeling package for the region to ensure that the regional project was compatible with the systems implemented for Dublin City and the regional GIS.

A query facility in the GIS enables the automatic extraction of network asset data in the SynerGEE file format. Hyder Consulting enhanced this functionality through the development of DemAsys®, a demand allocation and model building package that reduces inherent errors and inconsistencies in GIS data. The DemAsys tool facilitates the transfer of data from the GIS to SynerGEE.

The Dublin region network model was built in stages using the GIS extraction application and DemAsys. Each local authority model was constructed first at the DMA level and then merged to form larger water supply area models (WSAs). The WSAs created the local authority area models. The completed process consists of 200 individual models divided into 86 sub-models grouped by DMA; 56 trunk main models; 49 WSA models and seven local authority area models all forming the detailed all mains model.

The Dublin regional water project reduced leakage from 42.5% to 28%. Spanning 20 months from start to finish, the Dublin region model is the largest SynerGEE water model in the world, containing more than 187,000 nodes. The telemetry system, GIS and network model provide local authorities with strategic tools to use in efforts to conserve water and efficiently manage the system. The models remain in use by local authorities to review the effects of planning applications on the network, improve water conservation through pressure management and DMA design and in scenario analysis.

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The Dublin region network model project helps local authorities to address and repair regional water system problems. The metering system helps reduce UFW, track customer water usage and address leakage. The model also enables authorities to plan for commercial, industrial and residential growth throughout the region and provide the necessary infrastructure and water resources to supply the region in the future. *W&WI*

Authors' Note

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