

IMQS: WATER INFRASTRUCTURE MODULE

Water Infrastructure Planning and Operations Management Tool



WATER INFRASTRUCTURE MODULE

The IMQS Water Infrastructure Module is a web-based planning and operations management tool that enables better water infrastructure management.

The module integrates with specialist hydraulic software packages to offer a geographically linked, infrastructure-lifecycle focused representation of a municipality's water reticulation network. IMQS enables the consolidation of master planning results (hydraulic model analysis) in spatial (GIS), tabular and graphical formats. The centralised information, that links directly to a city's asset register, enables users to easily access and utilise important asset information such as performance, utilisation, criticality and replacement value, as well as important technical information such as pipe connectivity, length, material and diameter.

The IMQS Water Infrastructure Module curates information on a user-friendly web-interface that offers real geographic insight into a city's hydraulic system. In this way, municipalities are empowered to better plan, develop and manage their water systems and achieve greater levels of service to their clients.

TECHNOLOGY

IMQS is a web-based enterprise application software that enables effective infrastructure lifecycle asset management. The software consists of a collection of web-services and components that are supported by specialised tools and frameworks. The core platform provides an extensive set of generic functionalities, that together make the implementation of infrastructure projects possible. Due to its high level of configurability and ability to combine componentised sets of functionality, IMQS offers a highly flexible framework able to produce tailored-made solutions. Users primarily interact with the IMQS service through a browser-based front-end, which is additionally supported by tablet-based apps.

WHO WE ARE

IMQS builds specialised, GIS-centric software for the Infrastructure Asset Management market. This means that we are committed to conceptualising and constructing solutions for real-world problems that impact the lives of people, at all levels and from all communities, on a daily basis. It is our business to think of innovative ways to enhance the value of your organisation's physical assets, while you focus on the work that matters – delivering key services to your valued customers. IMQS's software is currently enabling effective decision-making, service delivery and customer satisfaction in over 100 government and private organisations in South Africa and internationally.

WATER MODULE CLIENTS

- City of Tshwane
- City of Cape Town
- Johannesburg Water
- Amathole District Municipality

TECH BENEFITS

- Cloud-based
- Seamless deployment
- Fast and Secure
- Customizable
- User-friendly
- Mobile

IMQS IN NUMBERS

- **143 534 km** combined length of water pipes
- **3 892 086** lines of code used to program our software and counting

Interfaces for the enterprise software follow REST principles, both internally and externally. All constituent services have a published API as their primary interface. These interfaces are the foundation on which the browser-based front-end is built. Standard protocols, like HTTP with JSON payloads, however, make it effortless for third parties to consume them for integration purposes. Authentication and authorization services enable security on the interface level.

IMQS's web-based stack runs on enterprise operating systems, including Linux (with Docker containerisation) and Microsoft Windows Server. Database technologies include Microsoft SQL Server and PostgreSQL, which are both tried and tested in high-demand environments.

A dedicated DevOps team manages on-site deployments from a central point. IMQS DevOps makes use of in-house developed, fit-for-purpose tools to manage client-specific data and configuration. The IMQS operations team attends to monitoring server health and service performance by using state-of-the-art monitoring software. This enables fast detection and pro-active response to potential issues in the production environment.

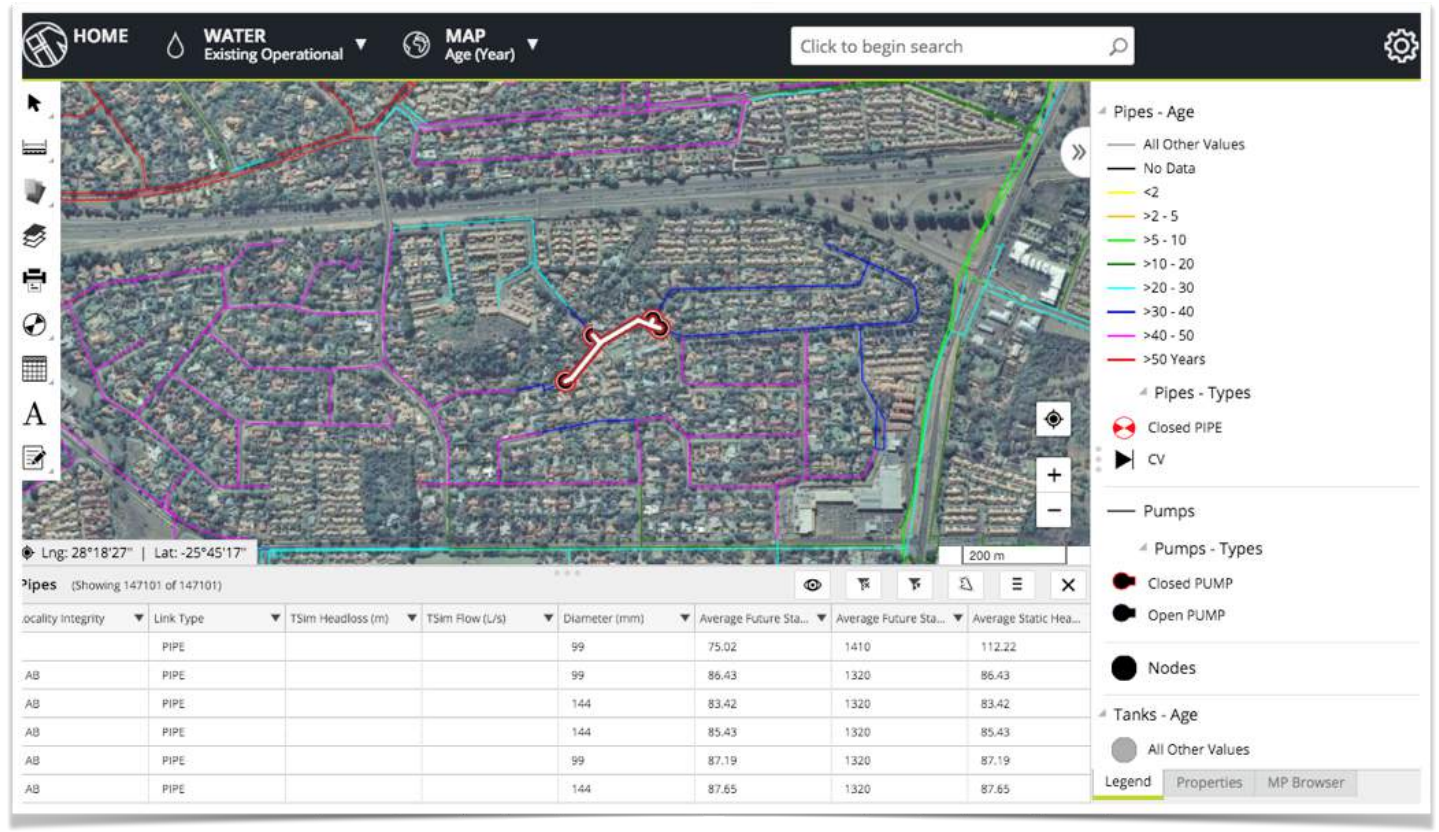


Image 1: Pipe Isolation Tool

KEY FEATURES

GEOGRAPHIC INFORMATION SYSTEMS



The GIS functionality implemented in the IMQS Water Infrastructure Module shows the water network infrastructure overlaid on a spatial map in order to visualize the complete water infrastructure of an area defined by municipal boundaries. The water infrastructure is made up of various layers, which includes pipes, water sources, valves, etc. Each layer is broken down into more detail and categorized according to a legend. The pipe network could be categorized according to pipe diameter where each range of diameters is colour coded on the map to be easily identified.

OPERATING SCENARIOS



In IMQS an operating scenario represents a spatial view of the existing scenario under certain conditions, as well as the demand of future (planned) water-network infrastructure. With IMQS an engineer is, therefore, able to easily model the effects of changes to a water network over time in the form of a Future Network Model. This offers real insight to future project planning and budgeting.

KEY FEATURES (continued)

THEMES



In IMQS, themes provide a user with the ability to easily interpret the data by spatially displaying map objects in the form of shapes, symbols and colours. A theme comprises multiple layers, where each layer contains data of the same type like water pipes, valves or water sources. Each layer in turn uses one field within the dataset. This means that values contained in the field are grouped into ranges and each range is then reflected as a specific colour on the GIS Map. The data is then displayed as a point, line or polygon on a map, where the colour and symbol is defined by the theme.

BESPOKE REPORTING



The reporting system is based on standard engineering reports that can be viewed on the IMQS built-in reporting platform. The reporting platform includes standard reporting tools such as filtering on a report or global level, but also more advanced capabilities that produce more complex reports, which include graphs.

COMPREHENSIVE DATA GRIDS



Comprehensive Data Grids display data on a GIS Map in a list format. Users are able to find a range of features, like water pipes, based on simple or more complex joint-filtering criteria. Other features such as sort, filter, export and conditional-statements selection are also included.

TELEMETRY



The Telemetry system implemented in IMQS provides its user with a spatial view of the operational status of their water network. Data is gathered from sensors across the water network and converted into information that can be displayed spatially on a GIS Map. Each cluster of sensors is represented by a symbol on the map and can provide its user intelligence to inform monitoring and decision-making.

MASTERPLAN BROWSER



The Masterplan Browser offers a spatial representation of current and future water-network related projects. A user is able to link project boundaries on a GIS Map to water network feature that exist in the Future Water Network Model. This function provides an engineer with a powerful tool to spatially visualise projects and their effect on the Future Model.

PIPE ISOLATION TOOL



The Pipe Isolation Tool enables users to identify which valves to close in order to isolate a pipe segment from the rest of the pipe network. The powerful tool helps save time during emergencies, like a burst pipe, by helping users to quickly find and close the right valves in order to minimize water losses. The functionality, moreover, supports planned maintenance on water pipes by ensuring that all valves are closed to avoid the unnecessary loss of water.

UPSTREAM / DOWNSTREAM TOOL



The upstream tracing tool allows users to easily determine the source of water flow. For example in the case of reservoir that feeds a selected pipe segment. With downstream tracing as user can determine the most immediate pipe network that is supplied by a selected pipe segment. Importantly, this functionality allows one to determine the impact on the downstream network when the flow of water to a selected pipe segment is cut off.

KEY FEATURES (continued)

CONNECTED STANDS / SMS NOTIFICATION



Connected Stands is a functionality that helps a user to identify all stands that are connected to a pipe segment. This tool can be used in conjunction with Pipe Isolation and Upstream/Downstream to quickly identify all stands that will be affected when a pipe is isolated or when the downstream flow is cut off. In the case of emergency repairs or planned maintenance, an sms can be sent to all owners or consumers linked to a selected stand on a GIS map to inform them of service interruptions.

MEMO TOOL



The Memo Tool enables its user to report data discrepancies on the model via the IMQS web browser, when incorrect data, reflected in the model, is compared to actual inspections. The user can identify the model feature, like a pipe or valve, on the GIS Map and report the discrepancy to the engineering firm responsible for the maintenance of the model via an automated emailing system.

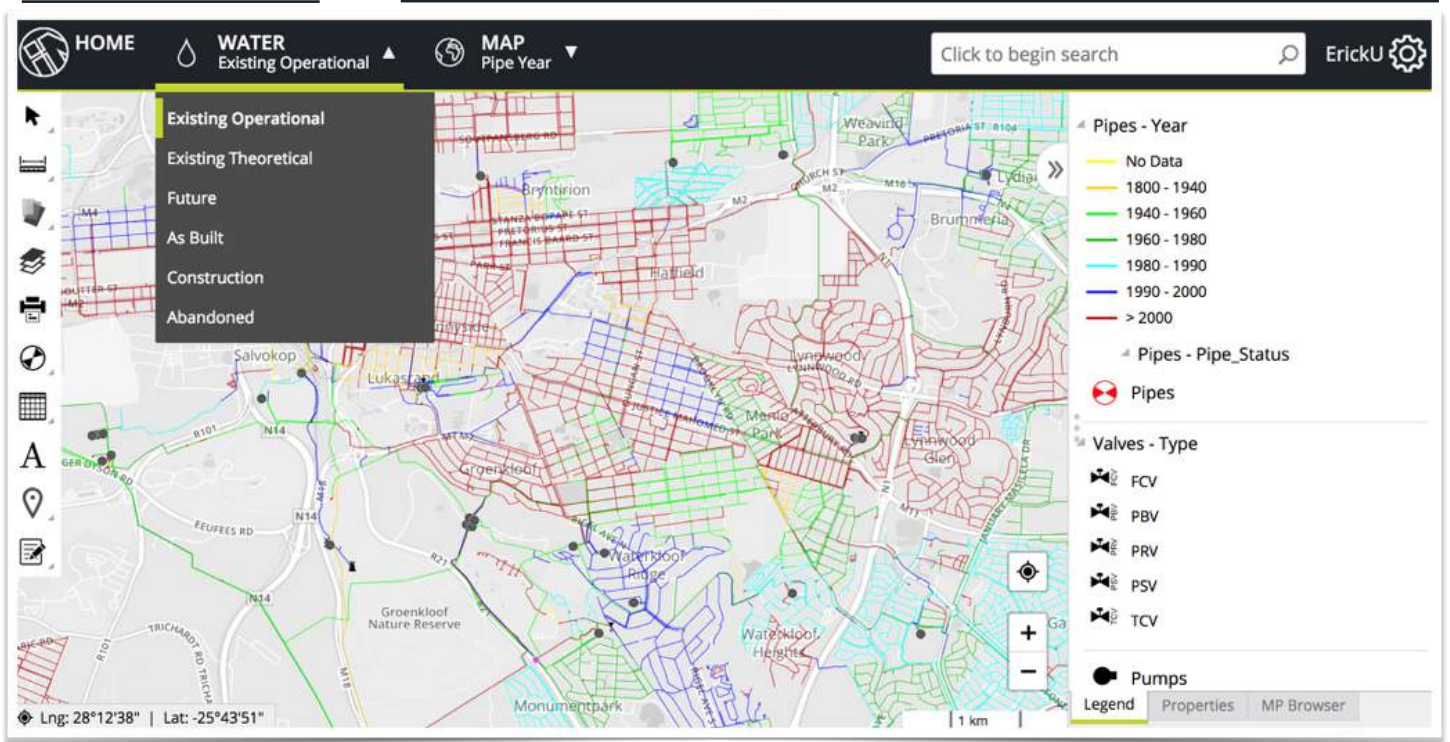


Image 2: Available Operating Scenarios

CONCLUSION

The IMQS Water Network Module empowers municipal agents to better manage their water infrastructure network. In so doing, this software package helps municipalities achieve greater customer satisfaction and concise communication. Our centralised spatially enabled information management system facilitates current and future planning, streamlines proactive and reactive maintenance and promotes informed decision-making. The visualisation of information, as well as innovative reporting functionalities, makes IMQS a key node in the communication between municipal stakeholders, departments and public. While IMQS maintains its own powerful GIS system, the module integrates with other GIS ERP systems, such as ESRI. This offers users the freedom to work on their preferred GIS platform without having to waste time by switching between systems.

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