"To the left of the driveway behind the shed." Imagine how long it takes to locate the water meter on a property when that's all the information you have about the meter's location. Now imagine it has been several years since anyone visited the meter at the property, and the shed no longer exists. That's a typical dilemma facing Goulburn Valley Water, a water utility located in Victoria, Australia.

Goulburn Valley Water provides urban water and wastewater services to 121,000 people in 54 towns and cities in an area stretching from the outskirts of Melbourne to the Murray River. With 58,000 water meters spread over 20,000 square kilometers (12,000 square miles), checking water readings and maintaining meters is a time-consuming and costly exercise.

Goulburn Valley Water intends to reduce that cost by accurately capturing the locations of all 58,000 meters, and replacing hard to access meters with meters capable of transmitting readings on water usage. Eventually they hope to have whole towns fitted out with this technology, which will enable the organization to obtain hourly flow data from the meters to gain an accurate snapshot of the water network. They will be able to use this information to track down leaks and other problems in the system, leading to better water conservation and management, as well as savings for customers.

"With this technology we'll be able to get a snapshot of the network at a particular point in time, whereas at the moment we can't. It's physically impossible to read every meter in a town at the same time", says Noel Squires, Information Systems Manager at Goulburn Valley Water. Currently, meters are read every four months. "That means a customer can have a leak for four months and won't realize it until they get their next bill. This can result in customers paying for water they're not actually using," says Squires.

The first step in the project is to find all of the existing meters and record an accurate location so that they can find them again. To do this, Goulburn Valley Water equipped their meter reader field crew with Trimble® GeoExplorer® 2008 series GeoXH™ handhelds and Zephyr™ antennas mounted on rangepoles. They chose GeoXH handhelds because they wanted the most accurate and reliable solution possible. Initially they chose a more complicated GIS data collection solution to run on the handhelds but as the meter readers are not GIS experts they were unable to collect the data they needed quickly and accurately. "It was too complicated. It's not what they [meter readers] do. We quickly realized it wasn't something we could just hand over."

After discussing the problem with the staff at Ultimate Positioning, their Trimble reseller, Goulburn Valley Water was advised to approach Thinking Windows, a software development company dedicated to providing billing solutions to the water industry. Thinking Windows was the obvious partner, as Goulburn Valley Water was already using their AquaRate software. What Goulburn Valley Water needed was additional GPS positioning functionality within the AquaRate software, and the Trimble GPS Pathfinder® Tools Software Development Kit (SDK) provided these tools.

The GPS Pathfinder Tools SDK provides a complete Application Programming Interface (API) that enables third-party developers to integrate GPS functionality into a software program. With just three developers, Thinking Windows was able to use the SDK to produce a reliable application that they named Aquire, for Goulburn Valley Water in just four months. Steve Tearle, Director of Thinking Windows, believes the SDK's robust API was critical to the team's success: "It was vital. We wouldn't have attempted it [the project] otherwise."

Writing applications for the Windows Mobile® operating system is complex and best practices must be employed, especially for managing memory, to ensure reliable software. The GPS Pathfinder Tools SDK is an example of leveraging these best practices. "We could develop the business application without worrying about low-level coding because the class library provided was so good. You can see this in the field because the end application is so robust" says Tearle. The result is a professional software product that meets the needs of their customer. The Thinking Windows team even provided full product documentation, including help files and training materials.

The Aquire software was a tremendous success for Goulburn Valley Water. With it, the organization is now considering changing the
meter reading process so that the meter reader picks up the location of the meter as well as the actual reading. Instead of a complicated user interface, meter readers simply see a big green button on the screen that says “Start”. The training time for the new software is just one hour, and meter readers feel much more confident and are happy to use it.

The faster data collection process is expected to result in real savings for the utility. “Every time you save five seconds, you can multiply that by 58,000” explains Squires. Previously, Goulburn Valley Water used pen and paper to record meter readings and then each meter reader spent up to one and a half hours traveling back to the office to deliver the paper forms. Originally, the organization envisaged hiring two additional staff: one person to coordinate loading the handhelds with data and then postprocessing the data, and another as an additional meter reader. The custom solution meant those two additional staff were not required, potentially saving Goulburn Valley Water ongoing salary and training costs.

Instead of having a coordinator in the office, Thinking Windows was able to customize the AquaRate software to send information related to groups of meters to the handheld, which mimics the walk route sequence the meter reader uses. Hence data is collected using the most efficient route, saving time in the field. Using a web service, up to 1000 meters per route sequence are exported to the handheld via a web service from the AquaRate billing system, which uses a Microsoft SQL Server database. At the end of each day, each meter reader sends the data to the office using the GeoXH handheld’s integrated Wi-Fi radio to connect straight to the internet from their home—saving them up to one and a half hours’ travel time each day. The data from their route is uploaded via the web service back to AquaRate, complete with uncorrected position data. The hand held’s integrated Wi-Fi radio then uses the GPS Pathfinder Office software to postprocess the position data.

Recently the Thinking Windows team added laser rangefinder support to their Aquire software. The handheld is connected to the laser rangefinder using a Bluetooth® wireless technology. When a meter is located in a spot where GPS signals cannot be received, the meter reader uses a laser rangefinder to “shoot” the position from a known GPS location. Once again, the software user interface has been kept simple, with the addition of a single button to take the laser reading and automatically send the data wirelessly from the laser rangefinder to the handheld.

Goulburn Valley Water is also looking forward to the long term benefits offered by this solution. Over time each meter is intended to be replaced with an RF-enabled meter, which can transmit water usage to a “collector”, an RF-enabled device which collects the data from all water meters within a range of 200–300 meters (650–1000 feet) and sends the information back to the office. The GPS location data they are collecting now will be crucial in designing the network and deciding the most efficient location for each “collector” to be installed.

Satisfied with their meter location solution, Goulburn Valley Water is now contemplating other uses of high accuracy GIS data. The GPS Pathfinder Tools SDK is likely to be an integral part of any future solution, as it enables the simplification of data collection, allowing field crews to stay productive. “You never know when there’s something you’re going to need the location of” says Squires. He too, believes the GPS Pathfinder Tools SDK has been crucial to their success: “It’s the Swiss Army knife of GPS. It’s brilliant!”