

# GPS Mapping Is a Process – It Is Not “An Event”



An investment in a GPS mapping project by a rural water district or city is a great decision, and is by far, the best way to archive locations of utility infrastructure. After working on a large number of projects throughout the state, it has become evident that some RWDs and cities do not realize how much labor, not only on KRWA's end, but on the system's end, goes into the finished product. KRWA has a process for GPS mapping that, when utilized effectively, produces a great product. It works just like anything else – you get out of it what you put into it.

KRWA's GPS Mapping process involves four steps: Data Collection, Data Interpretation, Check-plot Review, and Final Corrections. When I write “utilize the process effectively”, I mean doing everything within the system's power to help make the new maps as accurate as possible.

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The yellow line in this graphic indicates the location of a waterline as drawn on a rural water district's as-built maps from the 1960's. Those as-built maps were produced by the project design consultant, and were likely based off of field drawings provided to the engineer by the engineer's resident or local inspector. Subsequently this rural water district learned that these as-builts were incorrect. The correct location is indicated by the blue line. The red x's are GPS points that were collected as part of the district's recent GPS mapping project. The variance between the original as-built and the correct location is more than 150 feet.

## Data collection accuracy

A GPS Mapping project begins with collecting the data. Before KRWA arrives, the system operators or representatives need to make sure the system has a plan set up so that all of the data can be collected in the least amount of time possible. If the system is a large RWD stretching into three or four different counties, it's a good idea to collect everything (such as meters, valves, line points, etc.) as we go to avoid having to travel back to the same areas again. Working in small municipal systems, work goes efficiently to collect all the meters first, then hydrants and valves, then sewer manholes. Collecting a large number of different features in a small area at the same time can be overwhelming.

Collecting data in RWDs is an entirely different venture than in a more urban setting. It is fairly easy for a district to guide KRWA staff throughout the system collecting all the meters, valves, cleanouts, etc.

Collecting the water line locations – although the most labor intensive – is the most beneficial feature. Waterline locations have to be included in the collection plan. Regardless of what it is – whether it's an old trench line that is visible through a pasture, or if there are road crossing signs, pipelines with tracer wire etc., – every known location of every feature on water lines should be collected. If those features are not including in the GPS mapping, then the system's new maps will really just be new versions of the old maps, with new ink on nice photo paper.

## Time to review Checkplots

At KRWA, data interpretation is solely KRWA's responsibility. After we have collected the data, we will lay out a set of check-plots, or rough draft maps, for the system to review. In completing this aspect of a project, it helps to have a set of as-built maps for us to use in order to draw the lines without any GPS coordinates on them.

Similar to Graphic A, the original as-built map as indicated by the yellow line is off by 50 feet compared to the green line which was mapped using GPS. The red line points indicate the actual location of the district's waterline which was spotted when the landowner was doing some excavation in the area.



Upon completion of data interpretation, the check-plots are sent to the district or city system for review.

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step. Many systems seem to put this responsibility on their back-burner, for lack of a better term. Instead, an intense review of the checkplots presents the opportunity for a system to really get its money's worth out of the investment. In most cases reviewing the maps seems to be the responsibility of one person, the operator. If your system has had mainly one operator throughout the existence of the utility and he or she is still alive, then you are lucky to be able to have that person's familiarity with the project incorporated into the GPS mapping project. But if the system has a new operator, with a fairly new board or council, I suggest that the local people make Check-plot Review a collective effort. Think about who may know where certain lines have been installed.

It doesn't matter who provides the information – whether it be a former operator, board or council member, or contractor. Make sure and exhaust all of the resources possible. The check-plots need to be reviewed because of the manner in which features were shown or connected in the mapping software. Operators frequently tell me that their system's as-builts show many pipelines incorrectly. The GPS mapping can improve the accuracy but

the known locations need to be incorporated. Otherwise, the new maps will have the same incorrect lines as the old maps.

### Final Corrections, Map Products

“Final Corrections” takes place after we have reviewed the corrected check-plots and have incorporated those corrections with the digital data. We will then set up a time with the system

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## Kansas Water Office Has Subsidy for GPS Mapping

In the Fall of 2010, the Kansas Water Office announced an expansion of the subsidy program to help public water systems obtain improved mapping utilizing GPS technology. The Kansas Water Office provides a subsidy of 50 percent of the cost of GPS mapping available to cities, rural water districts and public wholesale districts. Initially, the program was limited to those systems serving less than 1000 customers. As of August 25, 2010, the program was expanded to allow systems regardless of size to apply for the subsidy.

The program, funded through the Clean Drinking Water Fee Fund, provides grant funding to public water suppliers for assistance with GIS mapping projects that meet the following program parameters:

1. The program will provide a grant up to 50 percent (with a maximum of \$4,000) of cost of GPS mapping the water supply infrastructure. The project must map at least 70 percent of the water system.
2. There is no limit on the number of meters served by the public water supplier.
3. Applicants must have a State approved water conservation plan (approved January 1, 2000 or later).
4. Any qualified provider that develops data that meets the Kansas Water Utility Data Standards may be used by the applicant for mapping under the program; the project proposal with cost estimates must be provided with the application.
5. The GIS Mapping Assistance program has been extended for fiscal year 2014, ending June 30, 2014.
6. New projects must be completed within two years of the project approval date. In certain circumstances the completion deadline may be extended. Requests for an extension should be communicated to the Kansas Water Office no later than 30 days prior to the two-year deadline.
7. Grant funding is not available for the purchase of GPS units, computers or computer software.
8. Applications that meet all requirements will be approved and funded by the Kansas Water Office in the order the applications are received.
9. Funds for approved applications will be dispersed by the Kansas Water Office upon receipt of the Data Collection Summary and a copy of the final, itemized invoice for the project.

Any public water supply utility may apply for the GPS Mapping funding from the Kansas Water Office. For more information, visit the Kansas Water Office Web site at [www.kwo.org](http://www.kwo.org) under "Projects/Programs". The agency has \$112,000 available as of October 1, 2013. KRWA staff can also provide information concerning the subsidy program and help systems with the application. Give KRWA a call at 785-336-3760 or email [mark@krwa.net](mailto:mark@krwa.net) if you have any questions about GPS Mapping.

to travel there with a laptop and large monitor to go over everything one more time as well as collect any missing features.

KRWA can print different map types or formats. The printed maps are great and every rural water district or city should have them, but there is only so much that a paper map is able to show. The great thing about GPS mapping is having everything digital. If the district's or city's engineer wants the data for a hydraulic study, the data can be readily transferred to the consultant. KRWA has heard that many systems want to consider other engineers but they often believe that because one consultant has their maps, they are stuck with that consultant. The transfer of data in a GPS mapping project makes that point mute.

Also, KRWA typically sets the city or district up with a free viewing software so that they are able to zoom in, take measurements, etc. for better operations and maintenance. Though this viewing software is limited in that users are unable to make any changes or edits, users can easily find what they are looking for without flipping through pages of maps.

One feature of the software that KRWA believes is very underutilized is that data such as details about valves, lines, customers, etc. can be "joined" to the digital mapping. The reason this is not being done is generally because most systems have never developed simple databases of their features. Getting such information into a format that can be "joined" is not that arduous, however, most system operators and office staff don't seem interested in doing it.

As I've stated in previous articles, GPS mapping is a process – it is not an event. A good mapping project, whether it's GPS or even paper maps, is never completed.

Eventually a lot of the original water lines in systems will be replaced or extended. Keeping up on the mapping end of those updates is critical. As years go by, personnel and board

members change. Systems change too and when those changes are archived via GPS technology, those system's locating capabilities will be leaps and bounds from where they started.

*Mark Thomas has been a GIS Mapping Tech since September 2006. Mark has a bachelors degree in geography from Kansas State University and has specialized studies in ESRI's ArcView and ArcPad software. Mark lives in Seneca with his wife Michelle and their sons Trent and Levi.*



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<b>Doug Thorne</b> 620-340-2472	<b>Office</b> 620-256-6330
<b>Ben Thorne</b> 620-340-2473	<b>Fax</b> 620-256-6337
<b>Brett Thorne</b> 620-794-4950	<b>7 W. Broadway</b>
<b>E-mail:</b> <a href="mailto:doug_tws@yahoo.com">doug_tws@yahoo.com</a>	<b>P.O. Box 71</b>
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