

Technical Memorandum

To: Kathleen Deason, Foster Creek Conservation District
From: Stephen Swope, Pacific Groundwater Group
Re: WRIA 44/50 Groundwater Contour Map
Date: March 2, 2009

A groundwater contour map was generated for WRIA 44/50 using publically available information and previous WRIA 44/50 investigations. This memo describes the methodology to generate the map and recommendations for future refinement of the contours. Please contact me with any questions regarding the WRIA 44/50 groundwater elevation contour map or this memo. I would be pleased to discuss our recommendations with you in more detail.

This work was performed, and this memo and map prepared, in accordance with hydrogeologic practices generally accepted at this time in this area, for the exclusive use of the Foster Creek Conservation District (FCCD) and the WRIA 44/50 Planning Unit and their agents. No other warranty, express or implied, is made.

METHODOLOGY

Depth to water measurements recorded on driller's well logs were the main source of groundwater level information used to generate the contour map. This was supplemented by spring locations digitally available from the Bureau of Land Management (BLM) or identified on USGS topographic maps. Ground surface elevations were calculated from 10 meter digital elevation maps (DEMs) based on 7.5-minute topographic maps.

The methodology assumes the wells in Douglas County are generally water table wells and not completed in perched or deeper confined aquifers. In addition, the methodology assumes that any seasonal variation or long-term trend in water levels is negligible compared to the resolution of the study. The methodology used to generate the contour map is described in the following bullets:

- Driller's well log information is available online through the Washington State Department of Ecology's (Ecology) website. The online database was queried for all well logs recorded in Douglas County and both the scanned images of the logs and the Ecology summary table were downloaded.
- Depth to water measurements recorded on the scanned well logs were hand-entered into the summary table by PGG. Water levels were entered in feet, with positive values representing water below ground and negative values representing flowing arte-

sian conditions. Missing and illegible water levels were assigned a “999999” flag and documentation of a dry hole was assigned a “dry” flag. Where available, hydraulic test information was also hand-entered to the summary table.

- Ground surface elevations were estimated by calculating the mean ground surface elevation within an eighth of a mile from the DEM for the Public Land Survey System (PLSS) location of each well log with a reported water level.
- Groundwater elevations were calculated for each well by subtracting the depth to water measurement for a given well from the mean ground surface elevation calculated for the PLSS location of that well.
- Spring locations from the BLM and USGS topography maps were added to the GIS coverage to expand the groundwater data set. Springs were assumed to represent the intersection of the water table and ground surface.
- Groundwater elevation contours were generated through GIS analysis using the Natural Neighbors and Topo-to-Raster methods. A contour interval of 200 feet was selected so the wide variations in WRIA 44/50 water levels (from 300 to over 4000 feet above mean sea level) could be legibly contoured.
- Visually spurious contours were assessed by interrogating the associated well locations. Well logs were revisited to look for street addresses of wells that were different from the PLSS locations. When street addresses were not available, Douglas County parcel information was used to correlate the well owner name to tax parcels. Well locations were adjusted according to the results of this additional research and the data were re-contoured. Note this level of quality control was only performed on select wells that appeared to contribute to anomalous contours.
- Select wells in the Moses Coulee, Rimrock Meadows, and Jameson and Grimes Lakes regions were field inspected during previous water level surveys for FCCD (Pacific Groundwater Group, February 2006, Phase 1 Exempt Well Water Use Study). In the WRIA 44/50 contour map, the locations of these wells were moved from the PLSS locations to the field verified locations. Groundwater elevation contours previously generated for the Moses Coulee and Jameson and Grimes Lakes water level surveys have been added to the WRIA 44/50 contour map. Previously generated contours in the Rimrock Meadows area were not included because they did not offer additional information.
- Review of the Town of Waterville and Town of Mansfield well logs indicated some of the municipal supply wells are completed in deeper aquifers. These wells were removed from the analysis.

LIMITATIONS AND RECOMMENDATIONS

We have identified the following limitations of the groundwater contour map:

- The PLSS locations of many wells were found to be erroneous. Locations were only checked for areas where contours appears spurious It was not possible to quality control the locations of all wells under the scope and budget for this task
- Deep municipal wells were removed from the analysis but not all wells were checked for completion aquifer.

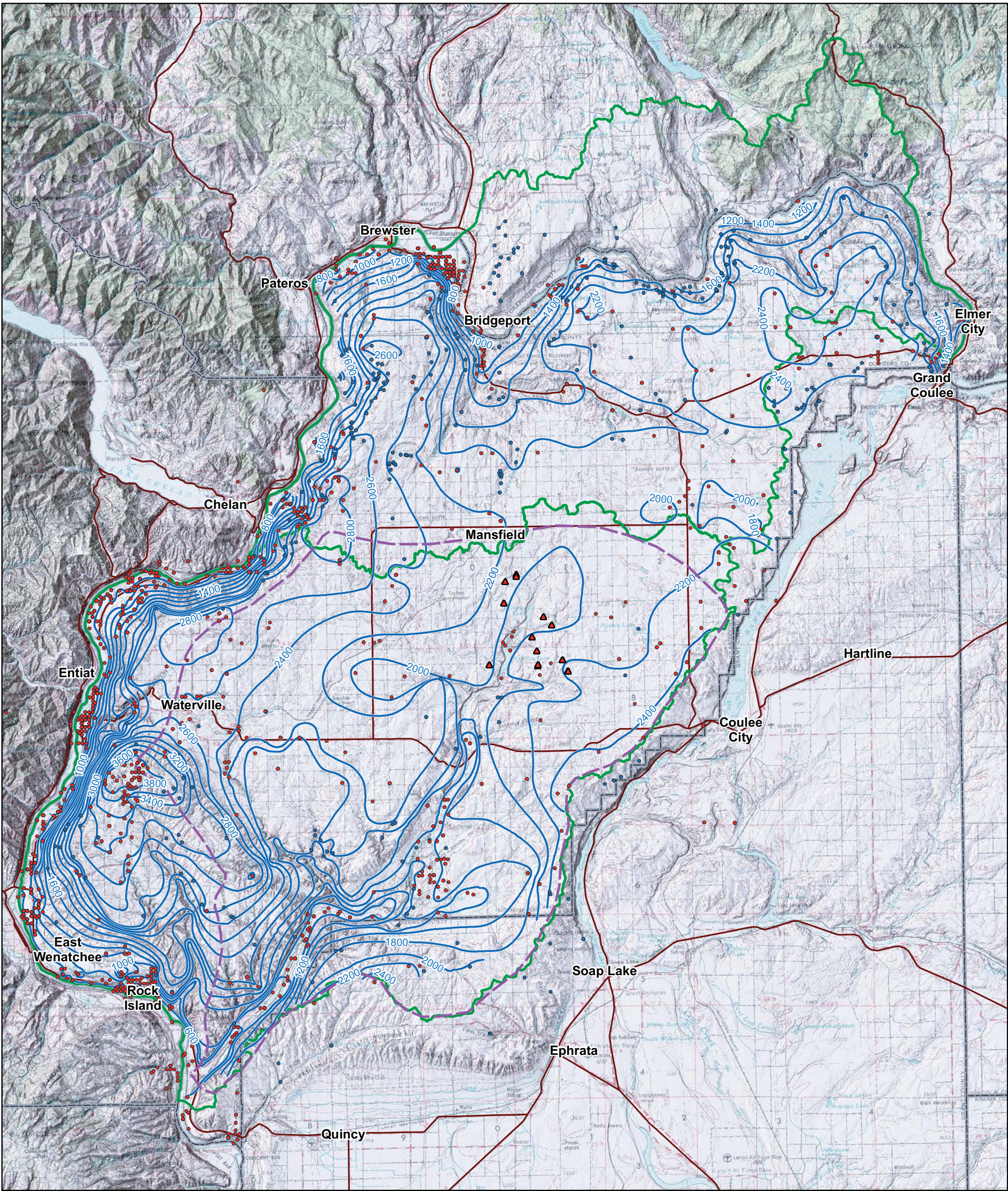
We have the following recommendations for future refinement of the map:

- Surface water features could be used to refine the contours in a similar manner to the way the springs were used in this phase.
- PGG could perform some additional research to more accurately locate wells in critical areas and review the well logs to filter out water levels that do not appear to reflect the water table.
- FCCD could elect to refine the contours throughout the WRIA or to refine them in critical areas only.
- Refine groundwater contours in the area north of Jameson and Grimes Lakes. The contour map reflects that there are few wells available from Ecology's database with PLSS locations in the area. A quick search revealed there are a number of water rights associated with wells in this area. It is possible the logs are in the Ecology database but the PLSS locations are incorrect. The water rights could be used to further research groundwater levels in this area. This may help to define the apparent groundwater divide that defines the northern boundary of the McCarty Creek groundwater basin.

REFERENCES

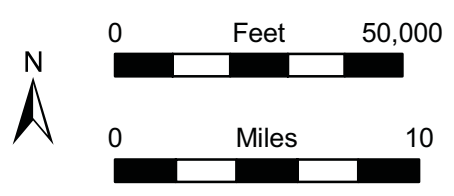
Pacific Groundwater Group, February 2006. Phase 1 Exempt Well Water Use Study. Consultants Report to the Foster Creek Conservation District and WRIA 44/50 Planning Unit.

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- Wells from the Ecology Well Log Database (water levels taken at time of drilling)
- ▲ Project Wells (water levels hand measured)
- Springs
- Groundwater Elevation Contours
- Estimated WRIA 44 Groundwater Basin
- WRIA Boundaries

Figure 1
WRIA 44/50
Groundwater Contour Map



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