



# *STAFF REPORT*

TO: Butte County Water Commission

FROM: Christina Buck, Water Resources Scientist  
Water and Resource Conservation

SUBJECT: Water Inventory and Analysis Update Advisory Committee  
Recommendations Regarding Methodologies

DATE: October 25, 2013

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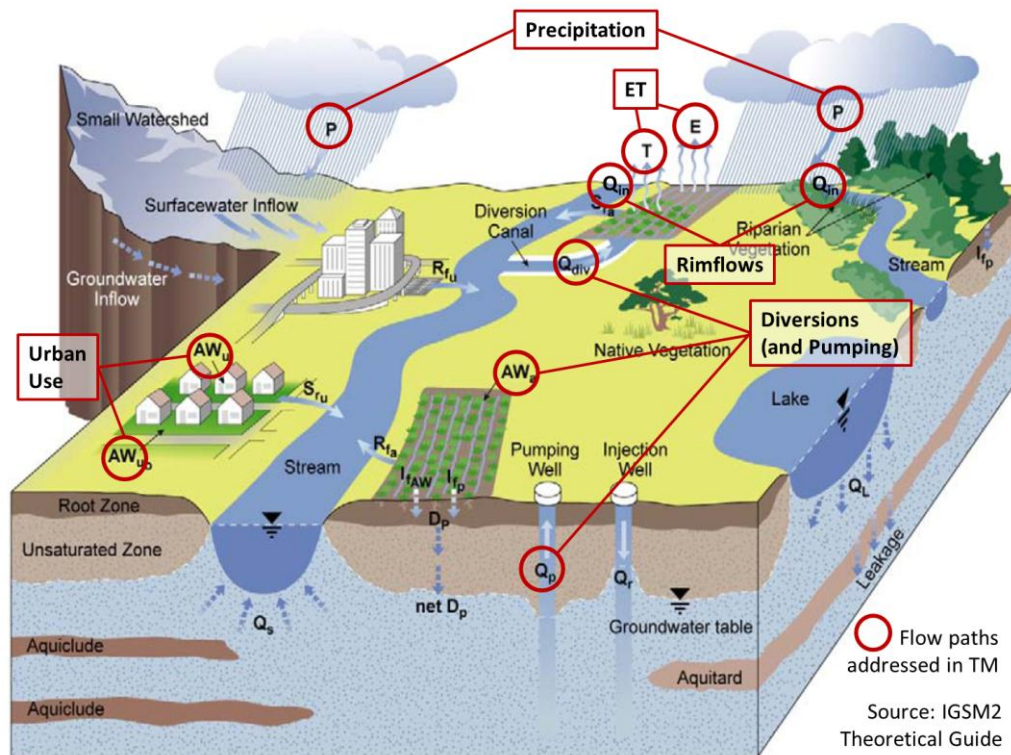
## **Background**

The Inventory and Analysis Update project is a component of the Water and Resource Protection and Sustainability Project that went before the Board of Supervisors in January 2013. With direction to the Department to proceed with implementation of the projects, an advisory committee was formed and a Request for Proposals for the Inventory and Analysis Update circulated. Davids Engineering was selected and contracted in May 2013. Over the past several months they have worked with staff to understand and evaluate prior approaches used to develop the model input data. The result is a Technical Memo (TM) describing proposed methodologies for the current Inventory and Analysis Update. The project plan calls for a review by the advisory committee and a presentation before the Water Commission prior to finalizing the TM. The TM will be finalized after discussion at the Water Commission meeting. No formal action is required.

The attached TM from Davids Engineering outlines the proposed methodologies developed to update and extend the time series in the Butte Basin Groundwater Model from its original period, 1970-1999, to 2000-2012. This will update detailed water balances (supply and demand) for each subregion. A productive and fruitful discussion with the project's advisory committee on October 24, 2013 (see attached agenda) evaluated the proposed methodologies and provided additional specific recommendations.

The advisory committee is made up of members from the Water Commission, the Technical Advisory Committee, Department of Water and Resource Conservation, and Department of Development Services. Those in attendance included: Richard Price, George Barber, Mike Pembroke, Dan Breedon, Paul Gosselin, and Christina Buck. Grant Davids and Byron Clark from Davids Engineering presented. Vickie Newlin attended via conference call for a portion of the meeting. Absent were Joe Connell and John Lane.

The figure below shows the components of the water budget (or 'flow paths') that require updated data. The modeling tools (Irrigation Demand Calculator (IDC) and the groundwater model (IWFMM)) will be used to estimate other flow paths such as net deep percolation and stream-aquifer interaction in later phases of the project. This memo describes recommendations received from the advisory committee regarding the proposed methodologies. More details regarding this project can be found in the TM, and the project work plan.



## **Recommendations**

### *Precipitation and Reference Evapotranspiration (ET)*

The proposed methodology recommends filling gaps in missing precipitation data (Sept. 1975-Jan. 1983) from the Oroville station by using correlation with and data from the Marysville or Paradise station. It was recommended that the Paradise station be strongly considered for correlation and gap filling due to greater similarity in elevation to the Oroville station, or a blending of the two stations be used.

Regarding developing ET estimates prior to the Durham CIMIS station record, it was pointed out that local private weather stations should also be considered as a possible source for long records of minimum/maximum air temperature data.

#### *Land Use and Future Cropping*

The Agriculture Commissioners office has agricultural land use data in GIS format for the last 4-5 years which will be a valuable data source since land use in areas of the county are changing fast as row crops are replaced by permanent crops and some rice land is planted with walnuts. It is recommended that Davids Engineering work with Richard Price and staff to use this data, particularly for the 2012 base year.

After discussion of various factors influencing future cropping patterns, it was recommended that a suite of scenarios be developed and brought back to the advisory committee for further review. These should explore upper-bound effects on the basin of changes in cropping associated with conversion of water source from surface water to groundwater (common in cases of conversion to orchards), and potential for newly irrigated land in the county.

#### *Crop Coefficients and Irrigation Efficiency*

During this discussion, the issue of water use for frost protection was raised. This had not yet been considered for inclusion in estimating demands. It was decided staff will take the lead on developing a methodology to estimate groundwater pumping for frost protection and work with Davids Engineering and the advisory committee to refine and implement it.

It was also recommended that irrigation efficiency values be reviewed by UC Extension Advisor Allan Fulton.

#### *Climate Change*

The committee was presented with a suite of options and approaches available and in use by the Department of Water Resources (DWR) and others for climate change studies related to water resources management. Discussion led to specific recommendations as follows:

1. Focus on a mid-century (i.e., 2050) time-frame, as opposed to end-of-century (i.e., 2100)
2. Choose from one of the 12 CAT scenarios most consistent with the scenario adopted for Butte County's Climate Action Plan (CAP).
3. Use the perturbation ratio approach from mid-century to maintain historical variability but reflect effects of changes in temperature and precipitation. Rely on perturbation ratios developed previously by DWR, if available and applicable to the study area.

#### **Conclusion**

Staff and Davids Engineering support the comments and recommendations of the advisory committee. Davids Engineering and staff will proceed with model development and data input for IDC and the groundwater model based on these recommendations and comments received at the Water Commission meeting. The recommendations will be incorporated into the methodology and be reflected in final documentation. Further follow up with the advisory committee and presentation to the Water Commission will occur as appropriate.