

Appendix H: Groundwater Flow Models



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Groundwater Flow Models

1.1 REFINED BASIN FLOW MODEL – NEWMARK GROUNDWATER FLOW MODEL (RBFM/NGFM) AND REFINED BASIN SOLUTE TRANSPORTATION MODEL (RBSTM)

The RBFM/NGFM is being used as a tool for evaluating basin-wide management strategies as outlined in the Integrated Regional Water Management Plan (Plan) through the Basin Technical Advisory Committee (BTAC) process established in 2007 when the Plan was adopted. The RBFM/NGFM is also being used as a tool in support of a Consent Decree (CD) stipulated Institutional Controls (IC) measures established for the Newmark Groundwater Contamination Superfund Site (NGCSS). The RBSTM is also being used to aid in IC related assessments, although on an informal basis, and to aid in evaluating basin-wide management strategies.

The RBFM/NGFM have been updated and refined since 2007 to better simulate the groundwater basin and the interaction with surface water hydrology and is currently undergoing numerous enhancements as recommended by a Peer Review process conducted in 2009. Valley District and SBMWD were successful in obtaining a grant from the EPA to fund the model enhancements through Cooperative Agreement Assistance ID No.: V-00T73801-0. The model enhancement team consists of staff from Valley District, SBMWD and their consultants, Geoscience Support Services, In (GSSI), Stantec, Balleau Groundwater, In and Wildermuth Environmental, In. A copy of the Work Plan submitted to the EPA as part of the grant application for the model enhancements are attached as Exhibit 1 for reference.

The model is a product of success as a result of teamwork between consisting of Valley District, SBMWD, their contractors and the USGS. Listed below is a summary of the progress made with the RBFM/NGFM & RBSTM model since 2007 and objectives of the model enhancements currently being undertaken:

- Improve the ability of the model to emulate the physical system for evaluating groundwater management initiatives.
- Utilize the watershed model developed for Valley District by GSSI to aid in constraining surface hydrology components (i.e. stream flow and return flow) for the RBFM/NGFM.
- Improve the ability of the model to make predictions for protecting the performance of the Newmark and Muscoy OU IRA's.

- Establish natural and artificial recharge thresholds in the SBBA. Analyze basin project management scenarios including additional mountain front runoff water capture and recharge opportunities.
- Improve and augment the work completed under USEPA Grant X-97957701-0 to allow evaluation of liquefaction potential, subsidence potential and salinity management.
- Develop a web-based interface that will allow the public to perform basic modeling runs online.

1.2 YUCAIPA GROUNDWATER BASIN FLOW MODEL

Development of the Yucaipa Groundwater Basin model is in the preliminary stages – the goal of this effort is to develop a management tool similar to the RBFM/NGFM for the Yucaipa Groundwater Basin.

Stakeholders to the Yucaipa Groundwater Basin Flow Model are the City of Redlands, San Bernardino Valley Municipal Water District, San Geronio Pass Water Agency, South Mesa Water Company, City of Yucaipa, Yucaipa Valley Water District and Western Heights Water Company.

The first step in the model development process is the analysis of the storage capacity and safe yield (average precipitation stored as groundwater) for each sub-basin. This effort is presently underway and will be complete by the end of 2013. Also underway is the investigation of possible recharge tests that will provide valuable data for the groundwater flow model while also testing the effectiveness of potential recharge areas. The goal is to begin recharge testing in the spring of 2014.

Intended groundwater flow model uses: Evaluate potential management strategies to determine their effectiveness before significant investment in facilities.

1.3 RIALTO-COLTON BASIN GROUNDWATER MODEL REFINEMENT

Efforts are underway through the Rialto/Colton Basin Collaborative Group. The purpose of the model refinement is to develop one model for the Rialto-Colton Basin from the existing models developed by the USGS (2001), San Bernardino County/Geo-Logic (2011), EPA/CH2MHill (2012), and ERM/Emhart (2013). The refined model will be a management tool, similar to the RBFM/NGFM for the Rialto-Colton Groundwater Basin, for evaluating basin management strategies and is capable of assessing remediation strategies.

Participants to the Rialto-Colton Basin Groundwater Flow Model include West Valley Water District, City of Rialto, San Bernardino Valley Municipal Water District, City of Colton, and Goodrich/UT. In addition, the US EPA and USGS staff have agreed to participate in the efforts in an advisory capacity.

Intended uses: evaluate potential basin management and remediation strategies to determine their effectiveness before significant investment in facilities.

1.4 RIVERSIDE-ARLINGTON GROUNDWATER FLOW MODEL

The Riverside-Arlington Groundwater Flow Model (RAGFM) was completed in 2011 and provides multifaceted support to Riverside Public Utilities (RPU) and the Western Municipal Water District (WMWD) to effectively manage groundwater resources. There is an ongoing expansion of groundwater management activities including increased groundwater level monitoring, recharge basin development and development of groundwater management plans (GWMPs). These activities will be significantly enhanced through the use of the RAGFM.

The RAGFM development process provided a more in depth understanding of the Riverside and Arlington groundwater basins' characteristics and behaviors and their relationship with neighboring basins. This enhanced knowledge has led to an estimate of the safe yield for the Riverside North, Riverside South and Arlington basins. In addition, the RAGFM, with extensive database and visualization tools will optimize monitoring, identifying data gaps that need additional monitoring and ensuring the overall monitoring program is delivering quality data.

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The RAGFM will also be utilized in the development of conjunctive use projects. The RAGFM will be used as a tool to analyze different management alternatives in support of the development of GWMP's while providing easy to use visualization data for stakeholders and the general publi

Intended stakeholders of the RAGFM are the City of Colton, City of Riverside Public Utilities, Jurupa Community Services District, Riverside Highland Water Company, Rubidoux Community Services District, West Valley Municipal Water District, San Bernardino Valley Municipal Water District, San Bernardino Municipal Water Department (RIX Facility), Western-San Bernardino Watermaster.