*Appendix G*
*Draft Groundwater Flow Modeling Report Predictive Simulations*

## 5.0 PREDICTIVE SIMULATIONS

This section describes the analysis of the scenario alternatives considered in selecting the recommended alternative to meet the RAOs for the SAOU, and describes the methodology used to conduct predictive simulations, the predictive simulation results, and the sensitivity analyses performed for the predictive simulations.

## 5.1 PREDICTIVE SIMULATION ASSUMPTIONS

The effectiveness of the scenarios in meeting the RAOs was evaluated using two methods:

1. Particle Track Simulation - Groundwater capture from the Target Area was evaluated qualitatively through the visual review of groundwater pathlines released from the Target Area boundaries from the beginning of the model simulation; and
2. Frequency of Capture - Groundwater capture from the Target Area was evaluated quantitatively through the analysis of the percentage of times that groundwater within the Target Area was captured by groundwater extraction wells (endpoint analysis).

The simulations were developed with consideration of the procedures outlined in USEPA's guidance document (*A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems* [USEPA, 2008]). The simulations were performed with the model code MODPATH (Version 3). MODPATH is a three-dimensional, numerical, particle tracking code developed by the USGS for calculating groundwater flow paths and travel times from the head solution output by MODFLOW. MODPATH is well documented and has been verified for a range of field problems (Pollack, 1994).

### 5.1.1 Particle Track Simulation

For purposes of qualitative evaluation, particles were placed around the outermost extent of the Target Area (see Section 5.1.4 for description of Target Area). Particles were placed at the midpoint vertically of Layers 1, 2, and 3. In Layer 4, particles were placed near the top of the layer (approximately 50 feet below the top of Layer 4 ) based on review of the

Target Area with respect to model layering. Particles were released at the beginning of the model simulation.

These simulated particle tracking results were used to develop maps that show model path lines originating from the Target Area, and the simulated probability of capture of groundwater from the Target Area in each of the four model layers. For Layer 2, particle tracks and frequency of capture results are not as relevant to the analysis of various scenarios. Due to the hydraulic properties of the BC Aquitard, particles released within Layer 2 generally did not move out of the model cells during the simulation. Therefore, frequency of capture results was only calculated based on the likelihood of capture from Layers 1, 3, and 4.

### *5.1.2 Frequency of Capture*

For purposes of qualitative evaluation, particles were placed in the middle of each grid cell in the Target Area for each layer. Particles were placed at the midpoint vertically of Layers 1, 2, and 3. In Layer 4, particles were placed near the top of the layer (approximately 50 feet below the top of Layer 4 ) based on review of the Target Area with respect to model layering.

Particles were released at the beginning of every year from 2012 through 2031 (20 years of the 42-year simulation period). Particles were released only for the first 20 years to allow all particles either to reach the proposed extraction well(s) or to move clearly beyond those well(s) within the 42-year simulation period. This approach limits bias resulting from particle with longer travel times that would eventually be captured if the model simulation times were extended. Nonetheless, frequency of capture is likely understated for some particles released in later periods in the simulations. Particle tracking for the simulations demonstrates that, at the end of a simulation, certain particles are on course to be captured by the proposed extraction well(s), but have not yet reached that extraction well during the time assumed in the simulation. The frequency of capture plot is generated using an endpoint file that is produced after a MODPATH run of each scenario. The endpoint file contains the data regarding starting and ending location for each particle that is released in any layer at any time during the simulation. From the end location of the particle it can be assessed if the particle is exiting at any of the remedy wells at the end of the simulation. For each cell where the particles are released 20 times during the simulation, frequency of capture is calculated using the ending location of the particle for each release time. For example, if the particles released in a given cell exit in any of the remedy wells for a particular

scenario for all 20 release times, the frequency of capture of contaminant by remedy wells within that particular cell would be 100%.

For the graphic purposes, the estimated frequency of capture is classified into five categories, 0-40%, 40-60%, 60-80%, 80-90% and 90-100%.

### 5.1.3 *Remedial Action Objectives*

As set forth in the 2010 ROD, Work Consent Decree, and SOW, the RAOs are to:

- Protect water supply wells and groundwater resources by limiting the spread of contaminated groundwater from the 160-acre area; and
- Remove contaminants from groundwater in the Target Area.

### 5.1.4 *Target Area*

The Target Area for hydraulic control of impacted groundwater is described in the Section 2.4.8 of the 2010 ROD and Section 2.2 of the SOW. The 2010 ROD (Section 2.4.8) defines the Target Area as:

> *"The Intermediate Aquifer Target Area is the portion of the aquifer within the footprint of and downgradient of the 160-acre area where COC concentrations in groundwater exceed chemical-specific ARARs. The upgradient boundary of the Target Area is near groundwater monitoring well CMW-3, the northernmost groundwater monitoring well on the 160-acre area where the concentrations of COCs have consistently exceeded chemical-specific ARARs. The downgradient boundary of the Target Area is where the Intermediate Aquifer is no longer present as a distinct aquifer. The downgradient boundary is in the vicinity of the 210 Freeway, approximately one and one-half miles to the southeast of the 160-acre area.*
>
> *The Regional Aquifer Target Area is the portion of the Regional Aquifer underlying the Intermediate Target Area where the concentrations of the COCs in groundwater exceed chemical-specific ARARs. The upgradient boundary of the Regional Aquifer Target Area is at or upgradient of well WVWD-22.*
>
> *The downgradient boundary of the target area is where the Intermediate and Regional Aquifers merge. The Aquifers appear to merge between WVWD-22 and Rialto-02. The location appears to be close to and possibly just upgradient of the Rialto-02 well."*

Section 2.2 of the SOW contains a similar definition of the Target Area.

Figure 5-1 shows the Target Area as depicted in the 2010 ROD. Figure 5-2 presents the Target Area in vertical cross-section, with the model layers and updated groundwater quality data.

### 5.1.5 *Flow Conditions*

Particle track simulations were based on the calibrated model boundary conditions (1970 through 2011). Treatment of pumping rates is discussed below. Initial heads were developed from the end of the 2011 calibrated model and the model was repeated to simulate 42 years from 2012 to 2053. A uniform effective porosity of 0.15 was used for all model layers, consistent with the USEPA 2012 Model.

### 5.1.6 *Pumping Rate for Non Remedy Wells*

Tables 5-1 and 5-2 present the production well pumping rates used in the predictive scenarios in gallons per minute (gpm) and AF/yr, respectively. The pumping rates for the production wells were based on 2011 pumping rates with the following exceptions where differing rates were assigned based on input from the water purveyors:

- To accommodate the WVWD-11 and Rialto-6 Project, each well was assigned an annual average pump rate of 1,613 AF/yr (combined rate of approximately 3,226 AF/yr);
- WVWD-54 was assigned an annual average pump rate of 1,000 AF/yr;
- WVWD-16 and WVWD-33 were assigned an annual average pump rate of approximately 775 AF/yr (rate of 387.5 AF/yr for each well); and
- Pumping at Colton-15, -17, -22, and -23 was set to zero to accommodate the increased pumping in SAOU Remedy wells.

To represent seasonal demands, the production well pumping rates for the model predictive scenarios were varied each quarter. This quarterly variation was either based on the actual 2011 pumping rates provided by the purveyors or where monthly pumping data were not available, quarterly pumping rates were estimated by using the percentages reported in Table C-4 (Appendix C) to allocate annual pumping rates to each quarter.

## 5.2 *PREDICTIVE SCENARIOS*

Emhart investigated numerous predictive simulations under two main pumping scenarios:

- Scenario 1 – assess whether RAOs are achievable using existing wells (Rialto-2, Rialto-3, Miro-2, and Miro-3); and
- Scenario 2 - assess whether RAOs are achievable using a combination of existing and new well(s).

Tables 5-3 and 5-4 show the annual average pumping rates for the evaluated extraction wells in gpm and AF/yr, respectively. For each of the above main scenarios, numerous iterations and sub-scenarios with varying pumping rates and well locations were assessed to arrive at the representative scenarios presented. In addition, Tables 5-3 and 5-4 include the frequency of capture as a percentage. A range of potential flow rates has been considered in recognition of the fact that available water rights may change in the future and will likely decrease, based on declining water levels in the RCB.

### 5.2.1 *County Remedy Considerations*

The following considerations were applied in regards to the County Remedy wells in development of the predictive scenarios:

- At a minimum, the County Remedy operates at its current extraction rate. Rialto-3 currently operates at an annual average of 1,157 gpm, and operational flow rates vary seasonally between 1,850 gpm and 900 gpm. The County currently achieves adequate hydraulic capture, as approved by the RWQCB, thus, this minimum threshold pumping is maintained for the potential combined capture (combined with Emhart's efforts).
- The maximum flow rates for the County Remedy wells under current water-level conditions are (in annual average): Rialto-3 = 1,630 gpm; Miro-2 = 2,200 gpm; and Miro-3 = 2,200 gpm.
- To simulate the varying demands during the four seasons, the County Remedy pumping rates for the model predictive scenarios were varied each quarter. This quarterly variation was estimated by using actual variations observed in 2011 basin-wide pumping data. Tables 5-1 and 5-2 summarize the quarterly pumping rates, as well as the annual averages in gpm and AF/yr, respectively.

The available water rights for the County Remedy are 1,300 gpm from the City of Rialto and 120 gpm from the City of Colton.

### 5.2.2 *SAOU Remedy Extraction Well Considerations*

The following considerations were applied in regards to the extraction well(s) for the SAOU Remedy in development of the predictive scenarios:

- The intent behind the location of proposed Well 1 in Scenarios 2B and 2C was placement within the Rialto Development Zone. Emhart evaluated alternative locations to the north and south but this location provided optimal capture.
- Under Scenario 2D, Emhart evaluated multiple locations of proposed Well 1 and proposed Well 2 to evaluate capture.
- The extraction well locations evaluated were placed near public right-of-ways (roads), where possible, or within the Rialto Development Zone.
- Multiple extraction well locations and pumping rates were evaluated to assess the extent to which a frequency of capture in excess of 90 percent (with the exception of Scenario 1A) could be achieved while most efficiently utilizing available (and potentially diminishing over time) water rights.
- To simulate the varying demands during the four seasons, the pumping rates for the model predictive scenarios were varied each quarter. This quarterly variation was estimated by using the percentages from the 2011 reported production wells data. Tables 5-1 and 5-2 summarize the quarterly pumping rates, as well as the annual averages in gpm and AF/yr, respectively.
- The available water rights for the project were considered in development of the scenarios including:
  - County Remedy: Total of 1,420 gpm as described in Section 5.2.1;
  - SAOU Remedy: 1,950 gpm from the City of Colton and potentially up to 1,000 gpm from WVWD; and
  - Combined Remedy: 3,370 gpm (4,370 gpm with WVWD).

### 5.2.3 *Simulated Groundwater Elevations*

As presented in Section 4.5, Figures 4-3, 4-4, and 4-5 show the basin-wide simulated groundwater elevations for the last stress period (end of calendar year 2011) for Model Layers 1, 3, and 4, respectively. This is the

distribution used for the beginning of the predictive scenarios. Figures 5-3, 5-4, and 5-5 show the basin-wide simulated groundwater elevations for Scenario 2B at the end of the simulation period (2053) for Model Layers 1, 3, and 4, respectively. Figures 5-6, 5-7, and 5-8 show the basin-wide simulated groundwater elevations for Scenario 2D-3 at the end of the simulation period (2053) for Model Layers 1, 3, and 4, respectively.

### 5.2.4 *Potential Recharge at Cactus Basins*

Muni Valley District and RCB water purveyors have indicated that they are exploring a potential groundwater recharge project in the RCB using water imported from the State Water Project. The USEPA has requested that Emhart utilize its model to, on a preliminary basis, model the potential impact of such a recharge project on the SAOU Remedy.

Although it has not yet identified potential recharge project options, issued a notice of preparation of the Environmental Impact Report required under California's Environmental Quality Act or applied for any necessary permits and/or variances, or obtained approval from the owner of the facilities to implement such a plan, Muni Water District has expressed interest in the potential use of one or more of the five basins in the San Bernardino County Flood Control District's (FCD) Cactus Basins. This system consists of five basins used for flood control and operated by the FCD. The basins have not been used for recharge of groundwater. Following discussions with Muni Valley District, groundwater recharge was modeled based on the assumption of 7,000 AF/yr of imported water being deposited into the Cactus Basins from April through October, starting in 2014, under three distinct options as presented below.

| Options | Descriptions |
|---|---|
| 1 | - Use Basins 1 and 2 only<br>- 3,500 AF/yr into each |
| 2 | - Use Basins 1, 2, and 3<br>- 1,400 AF/yr into Basin 1<br>- 2,100 AF/yr into Basin 2<br>- 3,500 AF/yr into Basin 3 |
| 3 | - Same as Scenario 2 for years 1-10 (thru 2024)<br>- Distribute proportionately among all five Basins in years 11 and beyond |

Notes:

Options were developed based on discussions with Muni Valley District.

## 5.3 *PREDICTIVE SIMULATION RESULTS*

This section presents the results for the predictive simulation and potential recharge.

### 5.3.1 *Predictive Simulation Results for Target Area*

The results of the particle tracking simulation and the frequency of capture from the Target Area for the scenarios listed in Tables 5-3 and 5-4 are shown on Figures 5-9 through 5-24. Scenarios were simulated using a range of pumping rates and extraction well locations to assess the extent to which a frequency of capture in excess of 90 percent (with the exception of Scenario 1A) could be achieved while most efficiently utilizing available (and potentially diminishing over time) water rights. The figures show the locations of existing production wells, including County wells Miro-2 and Miro-3, and proposed extraction wells. Modeled head elevations at the end of the predictive simulation period are shown on Figures 5-3 through 5-8.

Figures 5-9 through 5-12 present the particle track simulations and frequency of capture maps for scenarios that evaluate capture using solely existing wells Rialto-2, Rialto-3, Miro-2, and Miro-3. The simulation results indicate that, although a high degree of capture can be achieved when pumping solely from existing wells, the total pumping rates required to achieve that level of capture are significantly higher than scenarios where new extraction well(s) are used.

Figures 5-13 through 5-18 present particle tracking simulations and frequency of capture maps that evaluate capture using some combination of existing wells Rialto-2, Rialto-3, Miro-2, Miro-3 and one proposed new extraction well (Scenarios 2A, 2B, and 2C). These results indicate that a high level of efficient capture can be achieved with pumping from one extraction well located near the former Rialto Municipal Airport in combination with Rialto-3 (Scenario 2B).

Figures 5-19 through 5-24 present particle tracking simulations and frequency of capture maps that present potential capture using Rialto-3 and two new extraction wells in various locations. These results indicate that a high degree of capture can also be achieved, with potentially lower overall pumping rates, with two new extraction wells (Scenarios 2D-1, 2D-2, and 2D-3).

Based on a review of the scenarios presented, Scenario 2B (one new extraction well pumping with Rialto-3) and Scenarios 2D-1, 2D-2, and 2D-3 (two new extraction wells pumping with Rialto-3) provide a high degree of capture while maintaining efficient pumping rates that are within the available, or potentially available, water rights for the project. These scenarios also indicate that, should groundwater flow shift further to the west, necessitating a shift in where remedy groundwater extraction occurs, extraction wells Miro-2 and Miro-3 are viable future extraction well options.

### 5.3.2 *Predictive Simulation Results for Combined Target Area*

A preliminary evaluation of the effectiveness of the County Remedy combined with the SAOU Remedy was performed. For this purpose, a combined Target Area was defined to include the SAOU Target Area and the target area estimated for the County Remedy Area as outlined by the County (GLA, 2011). Emhart also consulted with the County to confirm that the estimate combined Target Area at the distal end of the BC Aquitard is reasonably represented. The combined Target Area is shown on Figures 5-25 through 5-28.

Figures 5-25 through 5-28 present simulation results using current Rialto-3 pumping rates and SAOU extraction well pumping rates for Scenarios 2B, 2D-1, 2D-2, and 2D-3. Particles are released at the beginning of the simulation period. These simulations suggest that under current Rialto-3 pumping rates, the northwestern extremities of the County Remedy Area may in the future, but has not (as confirmed by groundwater quality data collected by the County) impacted Fontana production wells F-49; future potential impacts are estimated to be in excess of 10 years after the beginning of the simulation period (2012). These results are consistent with simulations reported by GLA, the County's consultant, using the County Model, which show potential future impacts of production pumping in the general vicinity of Barrier H (GLA, 2011).

### 5.3.3 *Review of Predictive Simulations with Cactus Basins Recharge*

A preliminary evaluation of the potential impacts of implementation of recharge in the Cactus Basins was performed for Scenarios 2B, 2D-1, 2D-2, and 2D-3. As noted above, at this time only limited information is available concerning Muni Valley District's interest in using the FCD's Cactus Basins in the future for possible recharge activities. Therefore, for purposes of providing a preliminary evaluation of the potential for future

impact to the SAOU Remedy, the recharge rates listed in Section 5.2.4 have been assumed.

Figures 5-29 through 5-36 present particle track simulations and frequency of capture maps for the four scenarios where recharge is implemented in Cactus Basins 1 and 2 using the assumed recharge rates listed in Section 5.2.4. For these simulations, particle tracks are for particles released at the beginning of the simulation. These preliminary results suggest that, although there is a significant change in groundwater elevations in the immediate vicinity of Cactus Basins 1 and 2 with recharge taking place, implementing recharge in Cactus Basins 1 and 2 does not significantly impact capture of contaminants located in the Target Area.

Figures 5-37 through 5-44 present particle track simulations and frequency of capture maps for the four scenarios where recharge is implemented in Cactus Basins 1, 2, and 3 using the assumed recharge rates listed in Section 5.2.4. For these simulations, particle tracks are for particles released at the beginning of the simulation. These preliminary results suggest a significant change in groundwater elevations due to recharge; however, implementing recharge in Cactus Basins 1, 2, and 3 does not significantly impact capture of contaminants located in the Target Area.

Figures 5-45 through 5-52 present particle track simulations and frequency of capture maps for the four scenarios where recharge is implemented in Cactus Basins 1, 2, 3, 4, and 5 using the assumed recharge rates listed in Section 5.2.4. Since recharge in Cactus Basins 4 and 5 is assumed to commence 11 years in the future, Figures 5-45 through 5-52 show particle tracks of particles released 10 years in the future. These preliminary results suggest an even more significant influence on groundwater elevation and flow resulting in a negative impact to capture of contaminants located in the Target Area. This is a result of the implementation of Cactus Basins 4 and 5, which are more proximal to the proposed extraction well(s). Moreover, it appears that recharge in Cactus Basins 4 and 5 would induce a westerly gradient, resulting in the reduced effectiveness of the proposed extraction well(s).

The reduced frequency of capture presented in Figures 5-46, 5-48, 5-50, and 5-52 are also likely a result of the timing of the particle releases. Particles were released from 2022 through 2041, which resulted in a large number of particles not reaching the pumping wells before the end of the model simulation (2053). These results are similar to preliminary observations made by the USEPA, during its modeling efforts in December 2012.

These preliminary results suggest that if any of the Cactus Basins are used for recharge, adverse impacts include spreading of the 160-acre area plume in the vicinity of the proposed SAOU extraction wells, spreading of the 160-acre area plume downgradient of the proposed SAOU extraction wells, and generation of a westward gradient that reduces the County's ability to capture the County Remedy Area. There are a number of details about the potential recharge program that could affect the degree to which the recharge will affect ongoing and planned groundwater remediation projects. For example, it is not known at this time whether such recharge will occur in every year or only in some years, and in what pattern. Nor is it known how quickly or in what pattern the recharge water would be withdrawn from the basin.

These preliminary results confirm that using the Cactus Basins for recharge has the potential to adversely affect multiple groundwater remediation programs. If and when Muni Valley District's interest in using the FCD's Cactus Basins for possible recharge activities develops into an actual proposal to the owners of the basins and applicable local and State agencies, the necessary environmental impact assessments should include a comprehensive review and evaluation of its impact on the combined remedy and other groundwater remediation projects in the RCB.

## 5.4 *PREDICTIVE SIMULATIONS SENSITIVITY ANALYSIS*

A limited sensitivity analysis was evaluated using Scenarios 2B and 2D-1. The sensitivity analyses were performed to determine the sensitivity of particle tracking simulations and frequency of capture to selected parameters or flow conditions, including:

- The location of the Target Area in the Regional Aquifer;
- Horizontal hydraulic conductivity;
- Reduced pumping in all wells within the model domain; and
- Reduced pumping in all wells within the model domain except the remedy wells.

### 5.4.1 *Regional Aquifer Target Area*

As stated in Section 5.1.4, Emhart's current understanding of the Target Area is presented on Figure 5-1, as depicted in the 2010 ROD. Emhart is not aware of any data collected since publication of the 2010 ROD that

contradicts the USEPA's assessment of the extent of groundwater contamination at the 160-acre area. As shown on Figure 5-2, there are no results for wells screened in the Regional Aquifer north of PW-8. Recognizing the lack of Regional Aquifer data north of PW-8, Emhart evaluated effect of capture when the Regional Aquifer Target Area is hypothetically extended to the north.

For this analysis, the limits of the Target Area in the Regional Aquifer were extended to the north, approximately mid-way between WVWD-22 and the northern-most extent of the Intermediate Aquifer Target Area.

Figures 5-53 through 5-56 present the particle tracking simulations and frequency of capture maps where the Regional Aquifer Target Area has been extended northwards (i.e., dropping particles further north of the current Target Area). These results indicate that capture of the northern portion of the Target Area is diminished slightly, with some particles potentially not captured by the remedy wells. These northerly particles tend to flow more southwesterly towards the Miro-2, Miro-3 and the Fontana production wells. The corresponding frequency of capture is also diminished.

### 5.4.2 *Horizontal Hydraulic Conductivity*

For evaluation of sensitivity to horizontal hydraulic conductivity, the horizontal hydraulic conductivity values were decreased varied by 25 percent higher and lower than the calibrated values in all layers in the AOI.

Figures 5-57 to 5-64 present the particle tracking simulations and frequency of capture maps when horizontal hydraulic conductivity is varied by 25 percent; 25 percent lower and higher than the base assumption. These results show that hydraulic capture is not significantly reduced or improved by a change in horizontal hydraulic conductivity of +/- 25 percent. The high horizontal hydraulic conductivity simulations show a slight reduction in capture from particles released in the Target Area, while the low hydraulic conductivity simulations indicate an improvement of capture from particles released from the Target Area.

### 5.4.3 *Reduced Pumping*

For evaluation of sensitivity to reduced pumping, pumping in all wells within the model domain was reduced by 50 percent after 10 years due to potentially declining water levels in the RCB and resulting decreases in

available water rights. The sensitivity of capture was also evaluated with pumping in all wells reduced by 50 percent after 10 years except for the remedy wells.

Figures 5-65 to 5-68 present the particle tracking simulations and frequency of capture maps if pumping in all RCB production wells, including the SAOU Remedy wells, is reduced by 50 percent in the model domain after 10 years. Figures 5-69 to 5-72 present the particle tracking simulations and frequency of capture maps if pumping in all wells except the remedy wells is reduced by 50 percent after 10 years.

These results indicate that reducing pumping basin-wide will result in a significant reduction in the effectiveness of the capture of groundwater from the Target Area in both the Intermediate and Regional Aquifers. These results further indicate that maintaining proposed rates for the remedy wells while reducing pumping in non-remedy wells will only result in a small decline in capture of groundwater from the Target Area; however, this may not be a realistic option since the available water rights for the SAOU Remedy will also decrease if water rights within the RCB decrease.

### *5.4.4 Sensitivity Analysis Summary*

The results of this sensitivity analysis show that capture is sensitive to the dimension of the Target Area. Capture is only slightly sensitive to changes in horizontal hydraulic conductivity. Lastly, capture is extremely sensitive to a reduction in pumping after 10 years, which is conceivable if water levels continue to decline in the RCB, thereby reducing the available water rights to the RCB's water purveyors.

## *5.5 UNCERTAINTY IN MODEL SIMULATIONS*

Uncertainties in the Emhart Model include estimates and approximations in model design. These uncertainties include:

- The ability of the model to capture the temporal fluctuations in the Intermediate Aquifer, specifically in the vicinity of the County Remedy Area, where a high degree of heterogeneity is not captured by the model;
- The uncertainty of the hydraulic conductivity of the Intermediate and Regional Aquifer in the vicinity of the future extraction well system. Only one extraction well test has been conducted. Future testing of

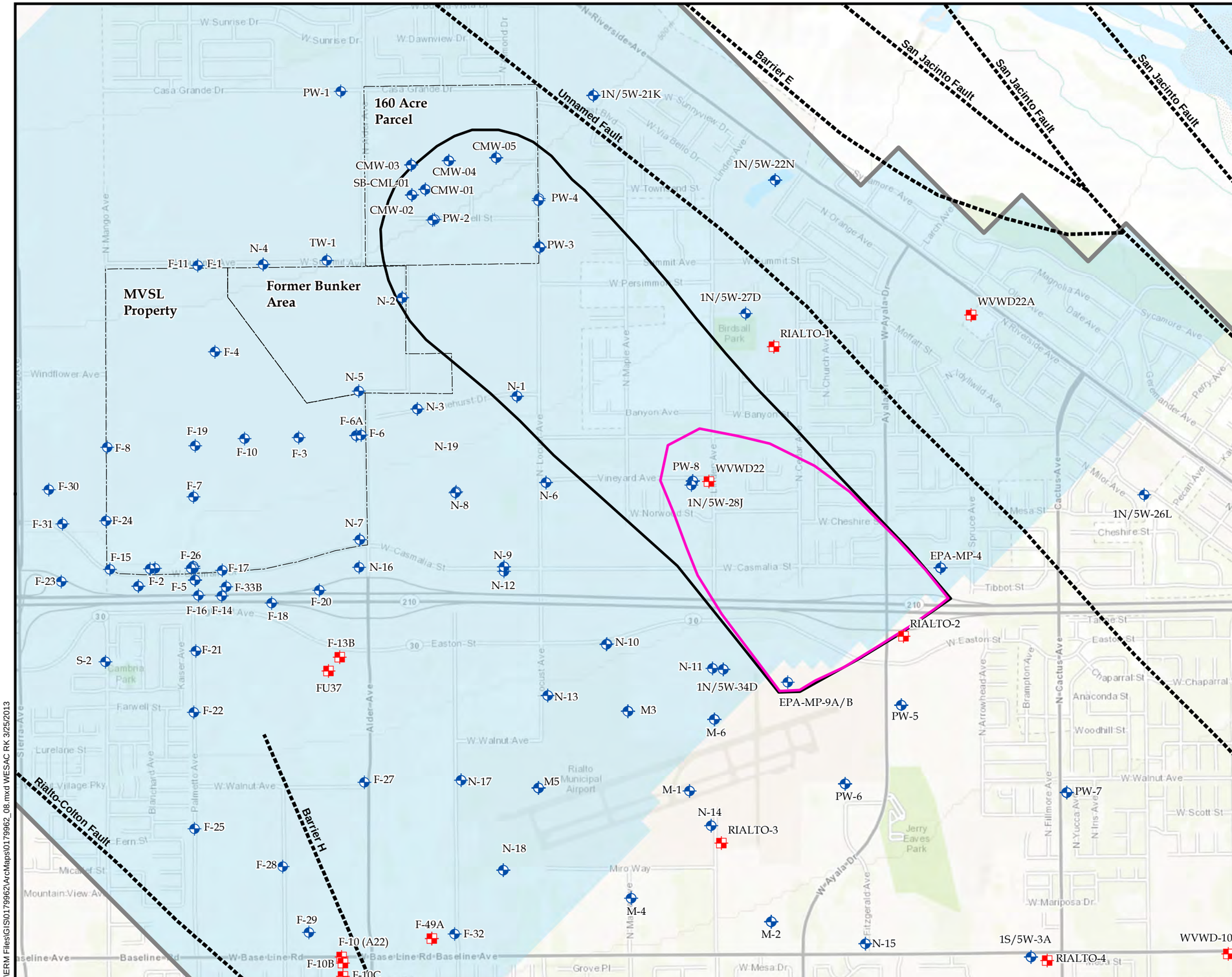
extraction wells, if possible, might reduce this uncertainty and aid in the remedy design;

- Characterization of the BC Aquitard in terms of vertical conductivity. There is a level of uncertainty regarding the extent of contamination in the Regional Aquifer due to a lack of data collected upgradient of WVWD-22. There is also some uncertainty regarding the characteristics of the BC Aquitard and its ability to inhibit the vertical migration of contaminants from the Intermediate Aquifer into the Regional Aquifer;
- Uncertainty regarding hydraulic properties of the Unnamed Fault and Barrier J, where little information exists regarding the ability of these faults to inhibit groundwater flow into the main part of the RCB;
- Uncertainties in future groundwater elevations and gradients, which are subject to climatic conditions and groundwater pumping by purveyors in and upgradient of the SAOU;
- Uncertainties introduced due to the availability or low density of hydraulic parameters, chemical concentration, and lithologic data in selected areas within the model domain; and
- Calibration is uncertain above Barrier J due to a lack of target calibration points.

Uncertainties in the Emhart Model also include the model's ability to simulate specific hydraulic conditions. These uncertainties include:

- The uncertainty of the accuracy of the model simulations during the early years of the calibration period, where minimal data suggest that calibration is less certain than in the later periods of the model simulation;
- Uncertainty regarding future pumping rates in the RCB and how those might impact groundwater flow patterns and available water rights for use in the SAOU Remedy; and
- Uncertainty regarding the possible implementation of recharge basins, which will also have a significant impact on groundwater levels and the direction of groundwater flow in the vicinity of the site.

*Figures*




Reference:
USEPA. 2010. *EPA Superfund Interim Action Record of Decision, Source Area Operable Unit, B.F. Goodrich Superfund Site*, San Bernardino County, CA EPA IS: CAN000905945. 30 September

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

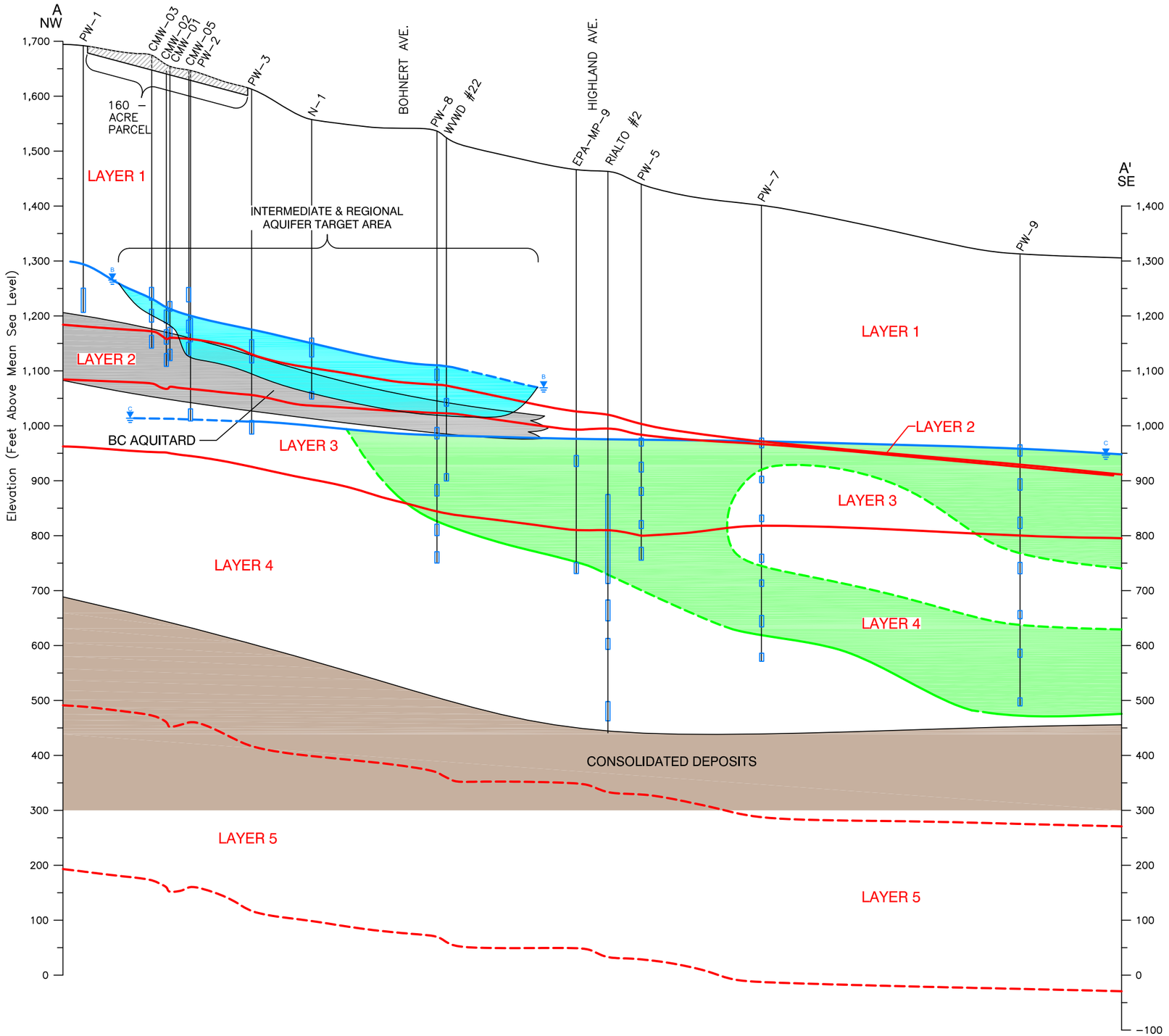
FIGURE 5-1

TARGET AREA FOR SOURCE AREA OPERABLE UNIT

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962.03.A FILE: 0179962_08.mxd |
|---|---|

F:\ERM Files\GIS\0179962\ArcMaps\0179962_08.mxd WESAC RK 3/25/2013




Approximate extent of perchlorate and/or trichloroethene exceeding Maximum Contaminant Levels in Intermediate Aquifer

Approximate extent of perchlorate and/or trichloroethene exceeding Maximum Contaminant Levels in Regional Aquifer

Water Elevation; most recent data available as of April 2012 in the Intermediate B or Regional C Aquifer as noted; dashed where not certain

Groundwater Screen Interval

Approximate Extent of BC Aquitard

Consolidated Deposits (Based on Interpretation by USGS [2001] and referenced by DPRA [2008])

Model Layer Contact; Dashed Where Inferred

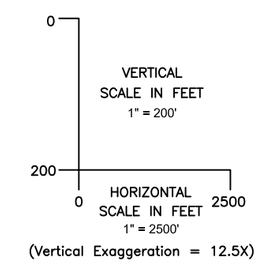
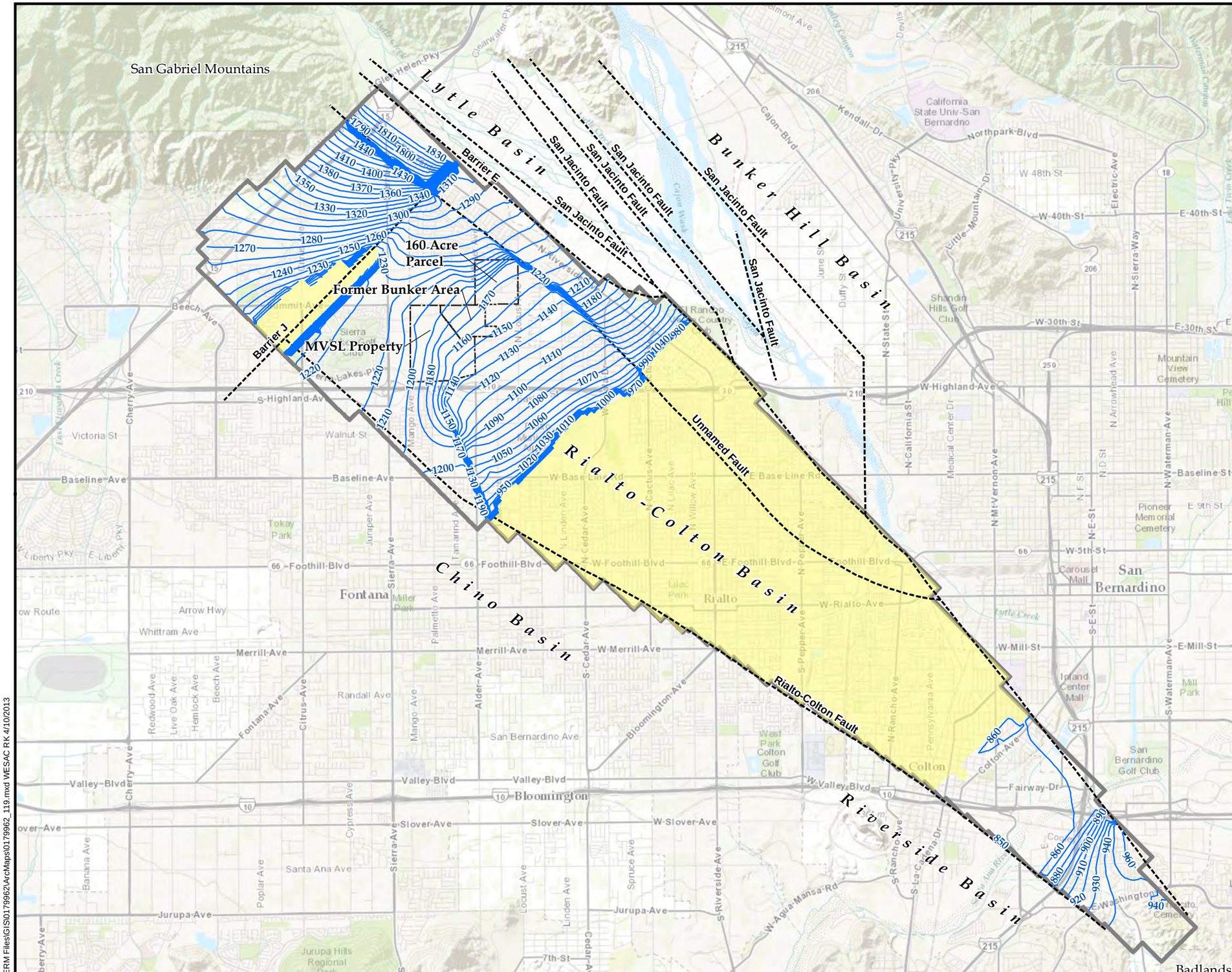



Figure 5-2
*Target Area - Vertical Cross Section*
*Source Area Operable Unit*
*B. F. Goodrich Superfund Site*
*Rialto, California*

ERM 03/13

Project No. 0179962.00
Date: 03/21/13
Drawn By: R. Olson
CAD File: G:\0179962\00\017996200-06.dwg




**Legend**

- Groundwater Elevation Contour
- Approximate Location Fault/Geologic Contact
- Site Boundary
- Model Boundary
- Model Dry Cells

Reference:
Esri (c) 2013 and its data suppliers.

N

0 6,000
Scale in Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

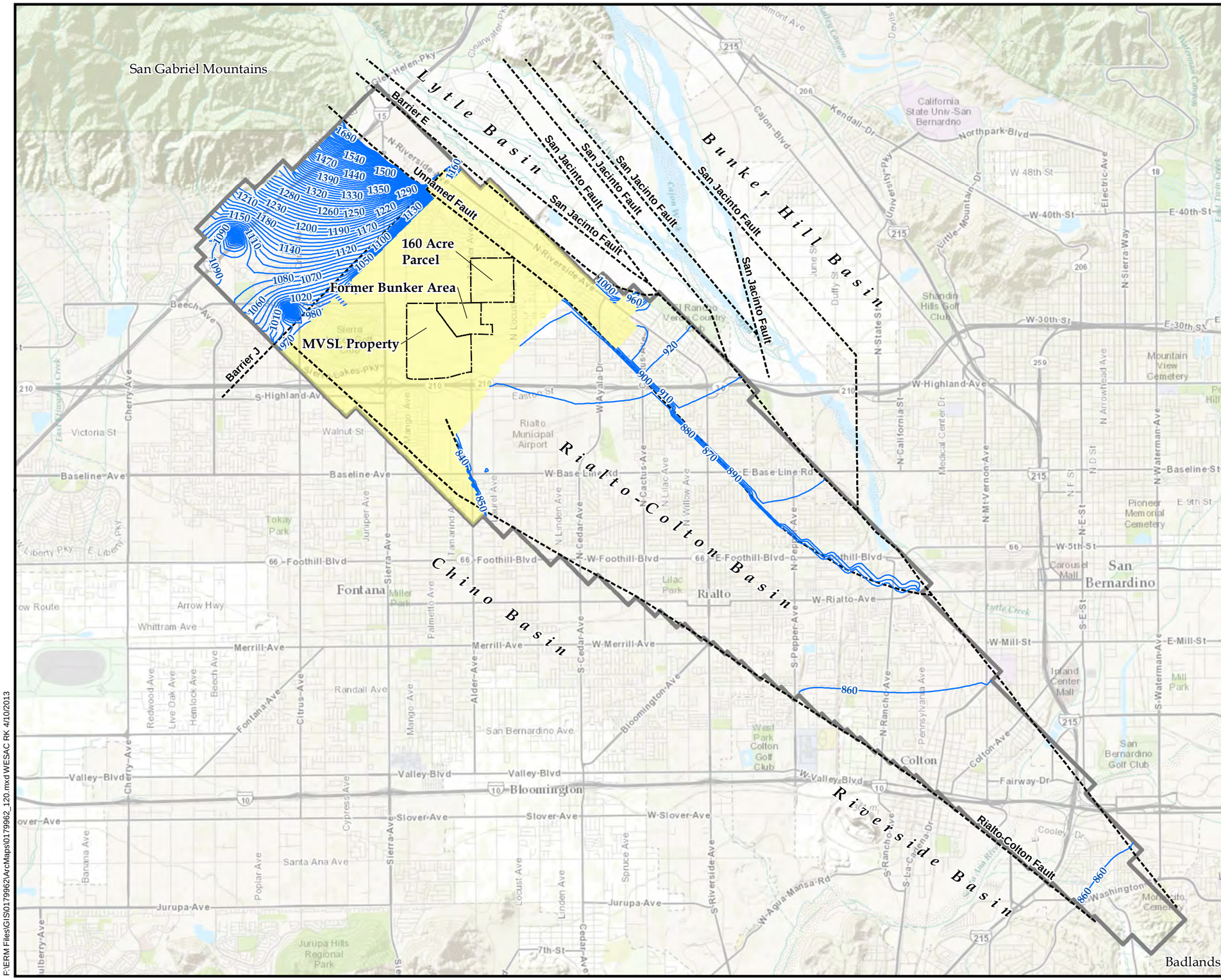
FIGURE 5-3

2053 BASIN-WIDE SIMULATED GROUNDWATER ELEVATIONS - MODEL LAYER 1, SCENARIO 2B

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962 FILE: 0179962_119.mxd |
|---|---|

F:\ERM Files\GIS\0179962\ArcMaps\0179962_119.mxd WESAC RK 4/10/2013




SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-4

2053 BASIN-WIDE SIMULATED GROUNDWATER ELEVATIONS - MODEL LAYER 3, SCENARIO 2B

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962 FILE: 0179962_120.mxd |
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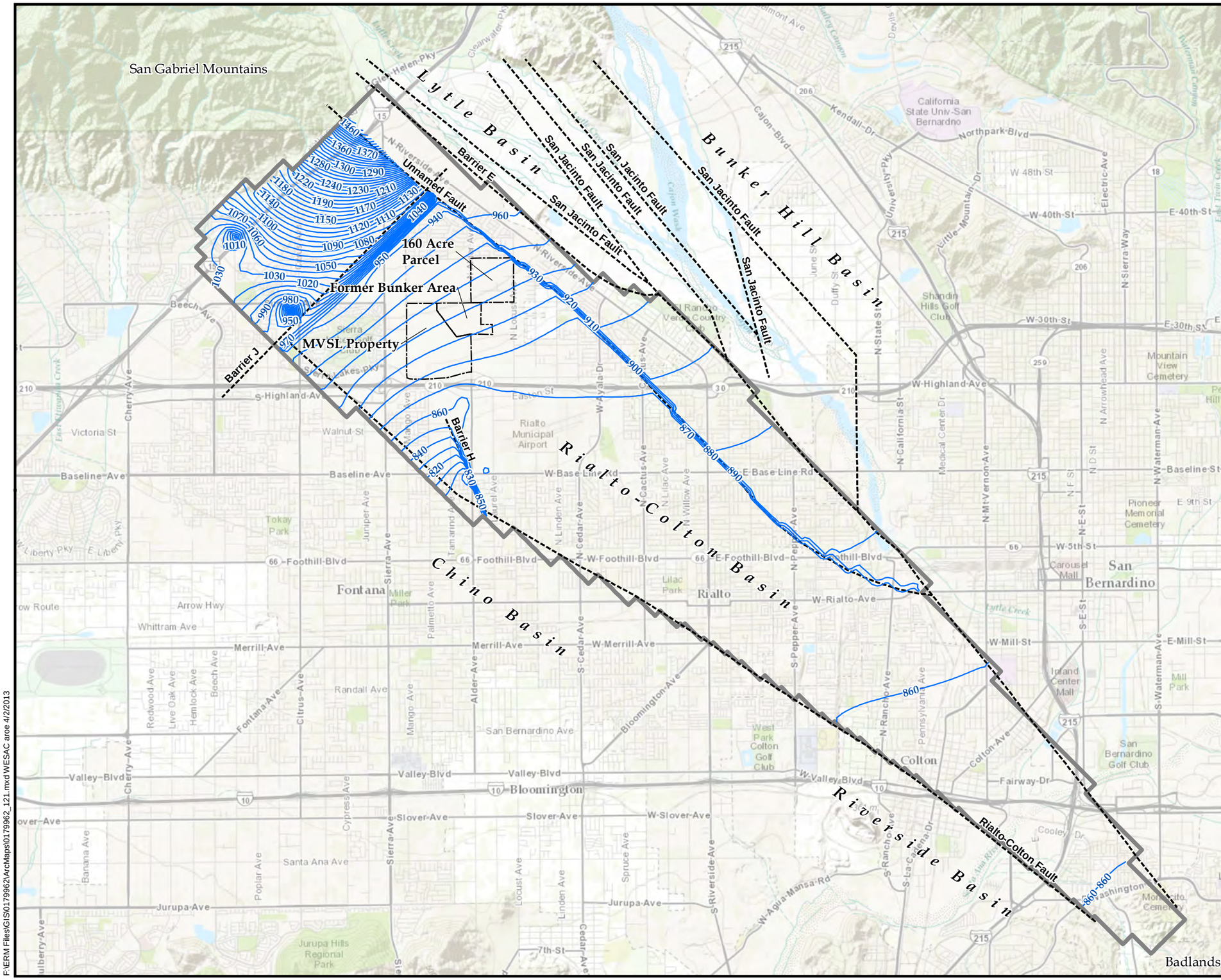



**Legend**

- Groundwater Elevation Contour
- Approximate Location Fault/Geologic Contact
- Site Boundary
- Model Boundary

Reference:
Esri (c) 2013 and its data suppliers.

N

0 6,000
Scale in Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-5

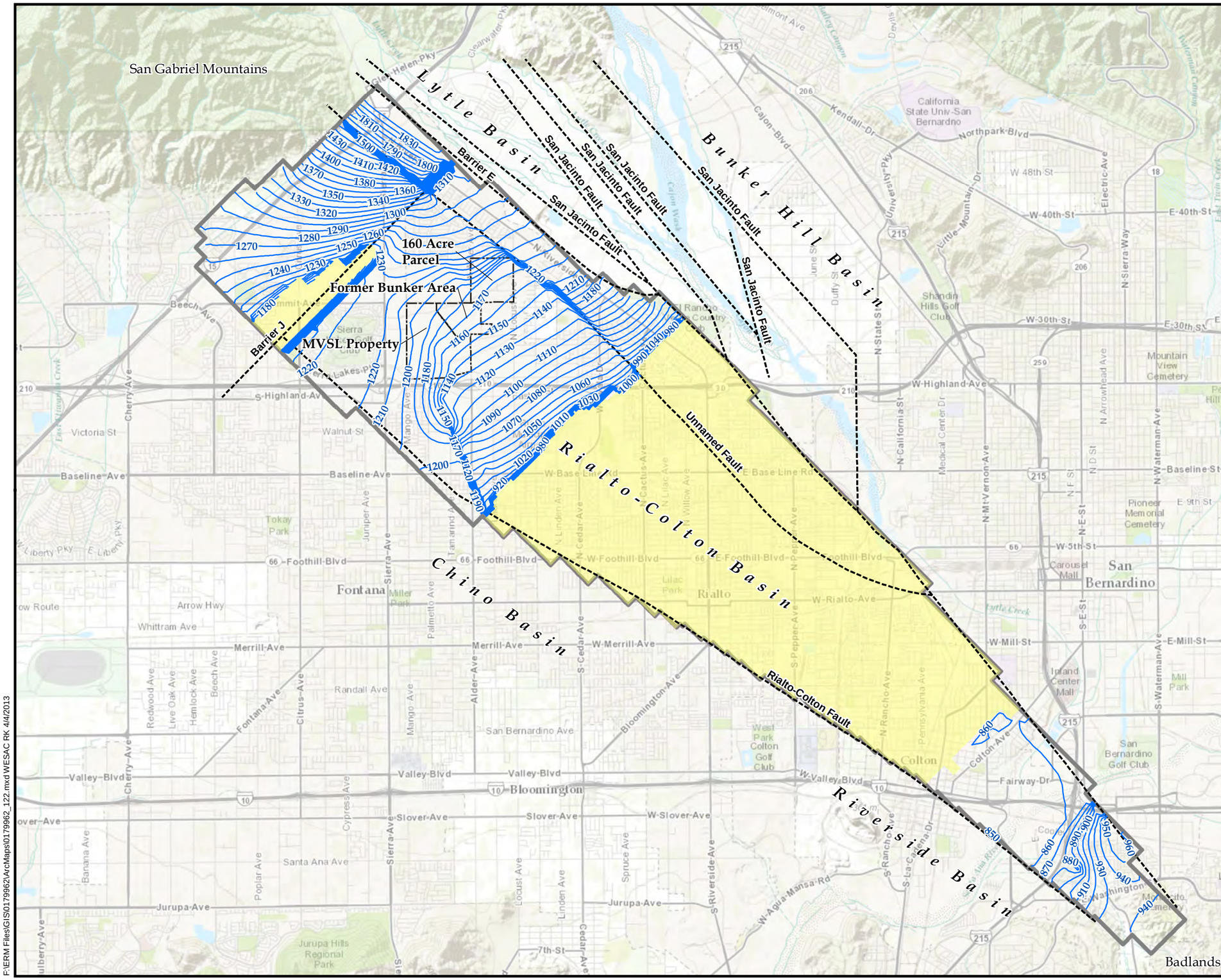
2053 BASIN-WIDE SIMULATED GROUNDWATER ELEVATIONS - MODEL LAYER 4, SCENARIO 2B

ERM

PREPARED BY: aroe (ERM)

JOB NO. 0179962
FILE: 0179962_121.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_121.mxd WESAC aroe 4/2/2013




**Legend**

- Groundwater Elevation Contour
- Approximate Location Fault/Geologic Contact
- Site Boundary
- Model Boundary
- Model Dry Cells

Reference:
Esri (c) 2013 and its data suppliers.

N

0 6,000
Scale in Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-6

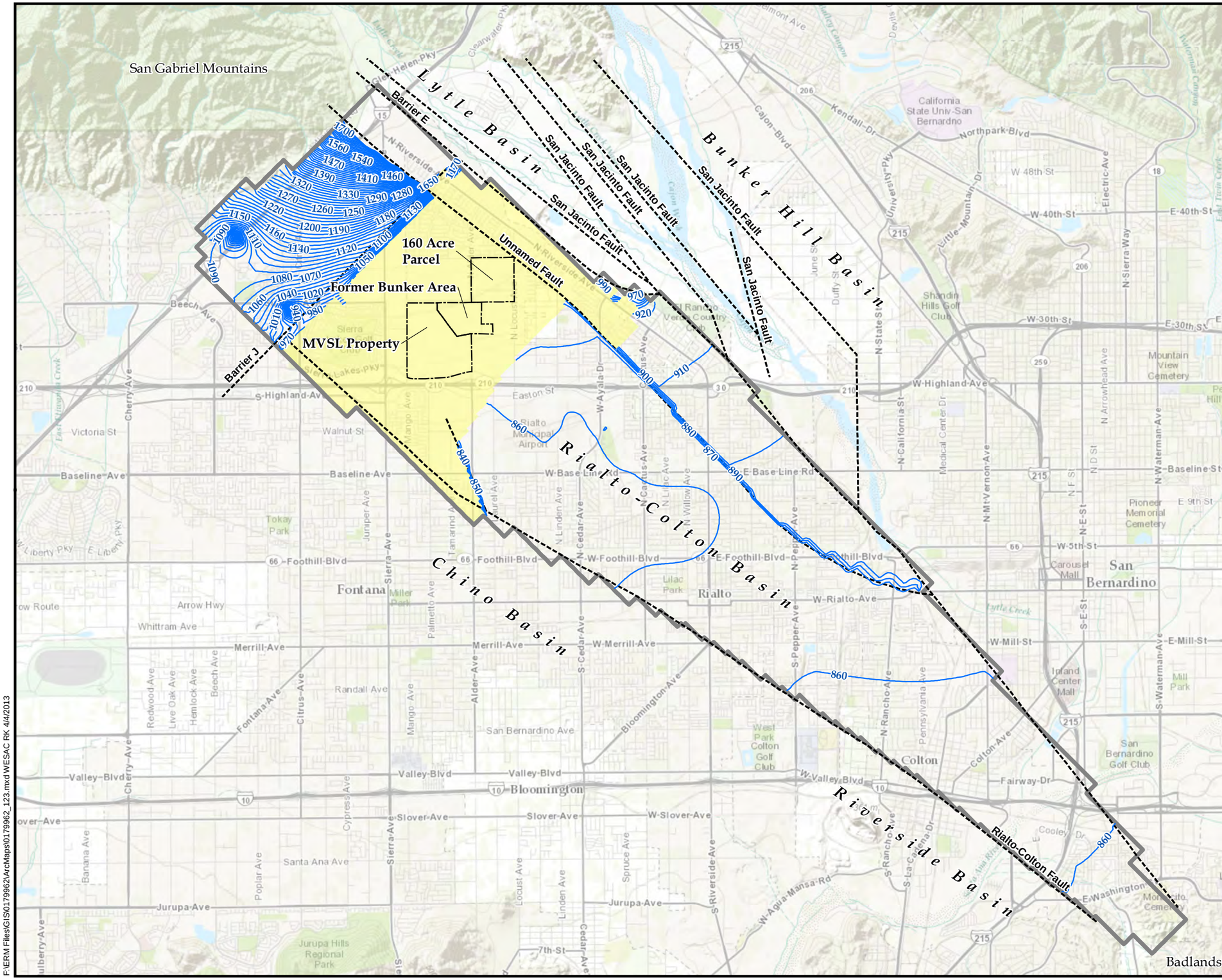
2053 BASIN-WIDE SIMULATED GROUNDWATER ELEVATIONS - MODEL LAYER 1, SCENARIO 2D-3

ERM

PREPARED BY: RK (ERM)

JOB NO. 0179962
FILE: 0179962_122.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_122.mxd WESAC RK 4/4/2013




**Legend**

- Groundwater Elevation Contour
- Approximate Location Fault/Geologic Contact
- Site Boundary
- Model Boundary
- Model Dry Cells

Reference:
Esri (c) 2013 and its data suppliers.

N

0 6,000
Scale in Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

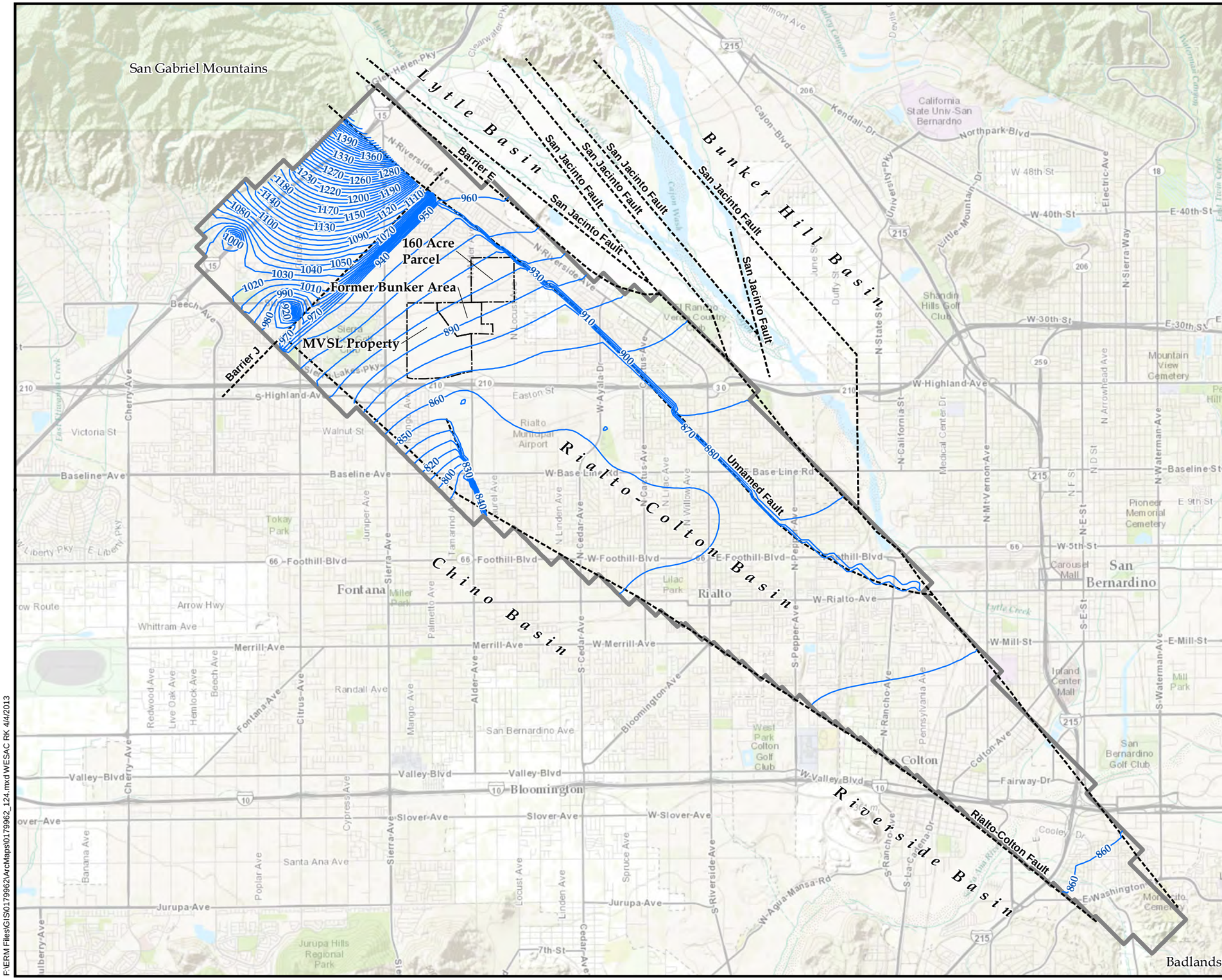
FIGURE 5-7

2053 BASIN-WIDE SIMULATED GROUNDWATER ELEVATIONS - MODEL LAYER 3, SCENARIO 2D-3

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962 FILE: 0179962_123.mxd |
|---|---|

F:\ERM Files\GIS\0179962\ArcMaps\0179962_123.mxd WESAC RK 4/4/2013




**Legend**

- Groundwater Elevation Contour
- Approximate Location Fault/Geologic Contact
- Site Boundary
- Model Boundary

Reference:
Esri (c) 2013 and its data suppliers.

N

0 6,000
Scale in Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

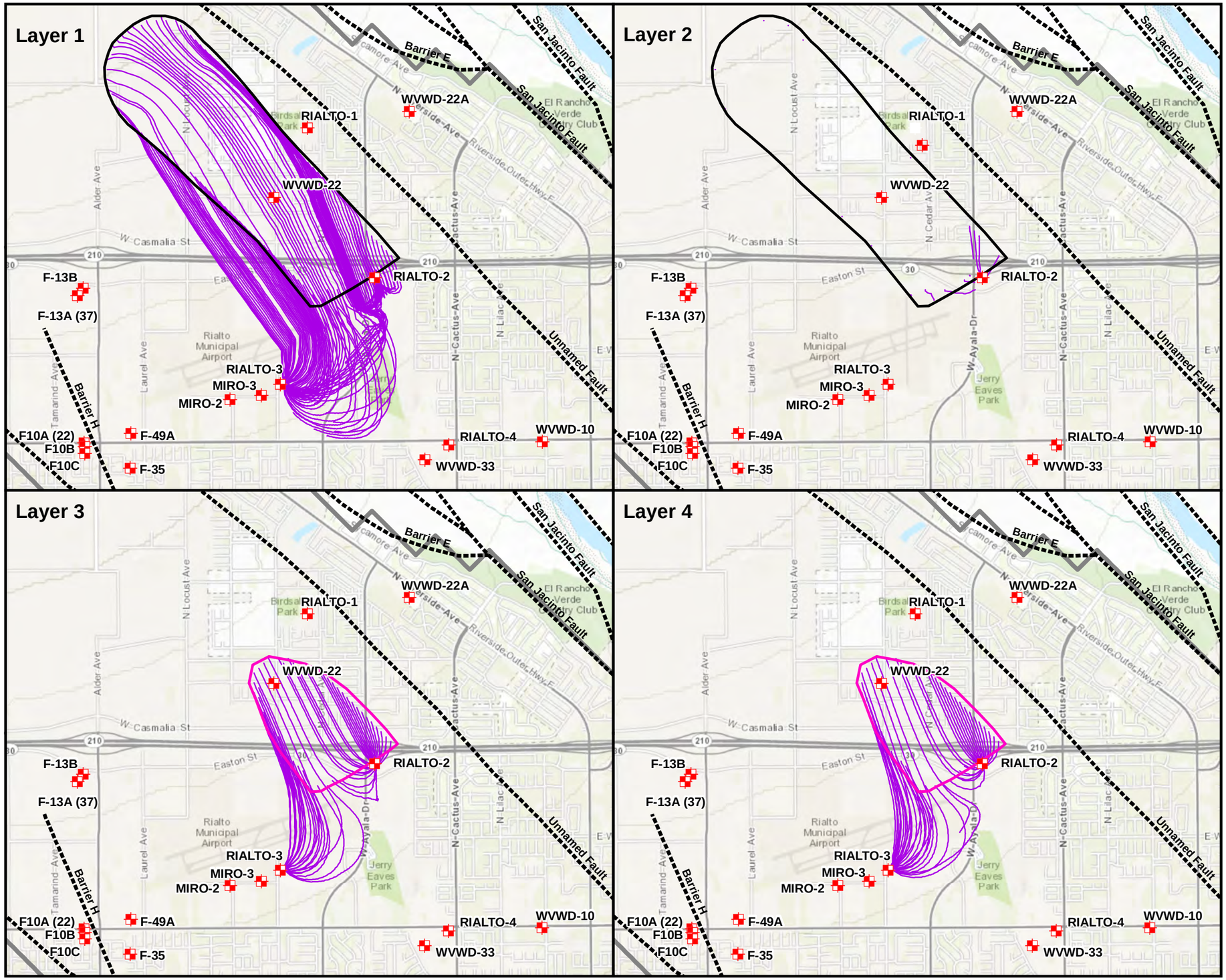
FIGURE 5-8

2053 BASIN-WIDE SIMULATED GROUNDWATER ELEVATIONS - MODEL LAYER 4, SCENARIO 2D-3

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962 FILE: 0179962_124.mxd |
|---|---|

F:\ERM Files\GIS\0179962\ArcMaps\0179962_124.mxd WESAC RK 4/4/2013




## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 2,000 | 3,228 | 1,363 - 2,245 |
| Rialto-3 | 1,630 | 2,631 | 1,111 - 1,830 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 0 | 0 | 0 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,630 | 5,859 | 2,473 - 4,075 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-9

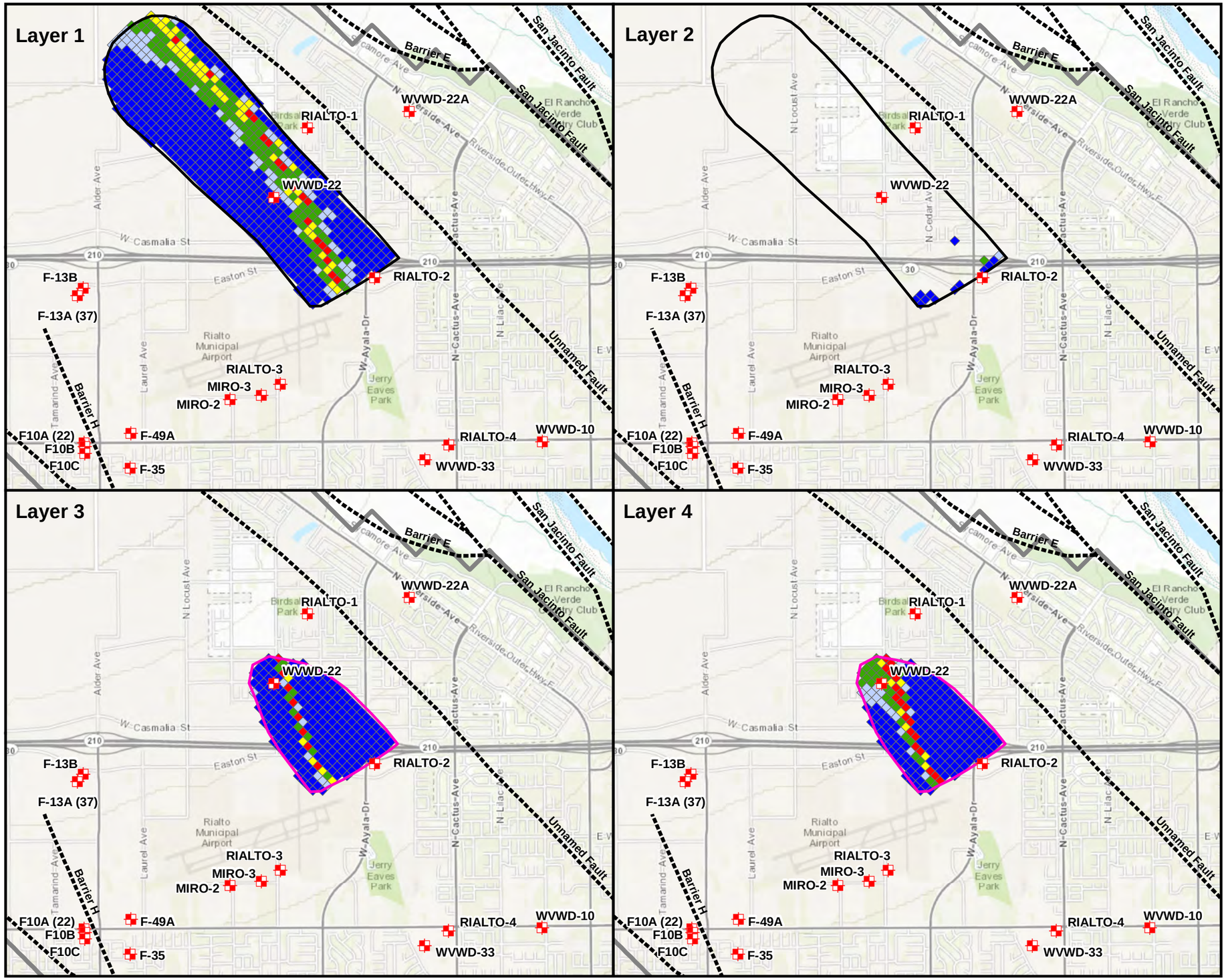
SCENARIO 1A
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_39.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_39.mxd WESAC CTALBOT 4/10/2013




## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 2,000 | 3,228 | 1,363 - 2,245 |
| Rialto-3 | 1,630 | 2,631 | 1,111 - 1,830 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 0 | 0 | 0 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,630 | 5,859 | 2,473 - 4,075 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-10

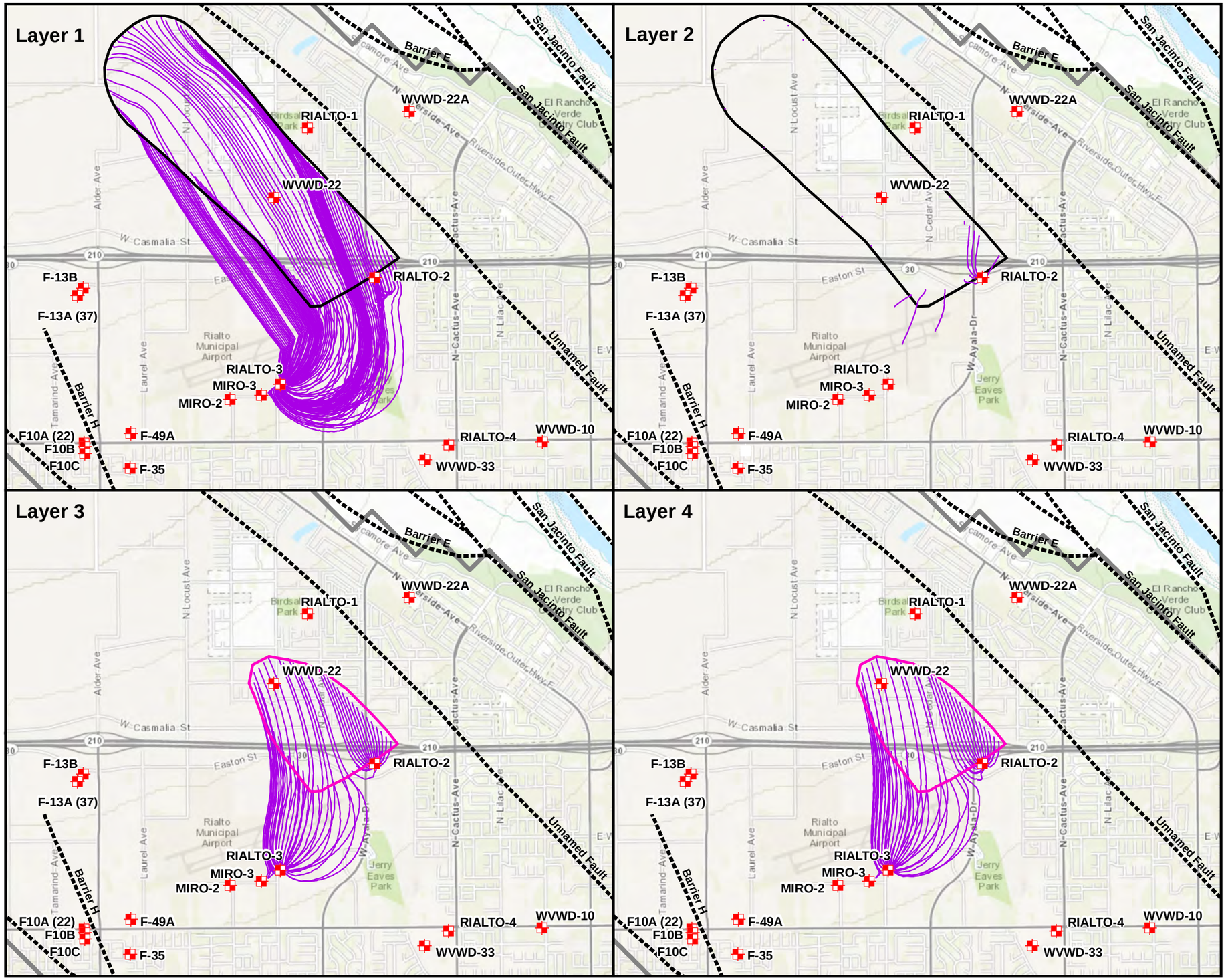
SCENARIO 1A
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_40.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_40.mxd WESAC CTALBOT 4/3/2013




## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 1,110 | 1,792 | 757 - 1,246 |
| Rialto-3 | 1,630 | 2,631 | 1,111 - 1,830 |
| Miro-2 | 815 | 1,315 | 555 - 915 |
| Miro-3 | 815 | 1,315 | 555 - 915 |
| Proposed Well 1 | 0 | 0 | 0 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 4,370 | 7,053 | 2,978 - 4,905 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-11

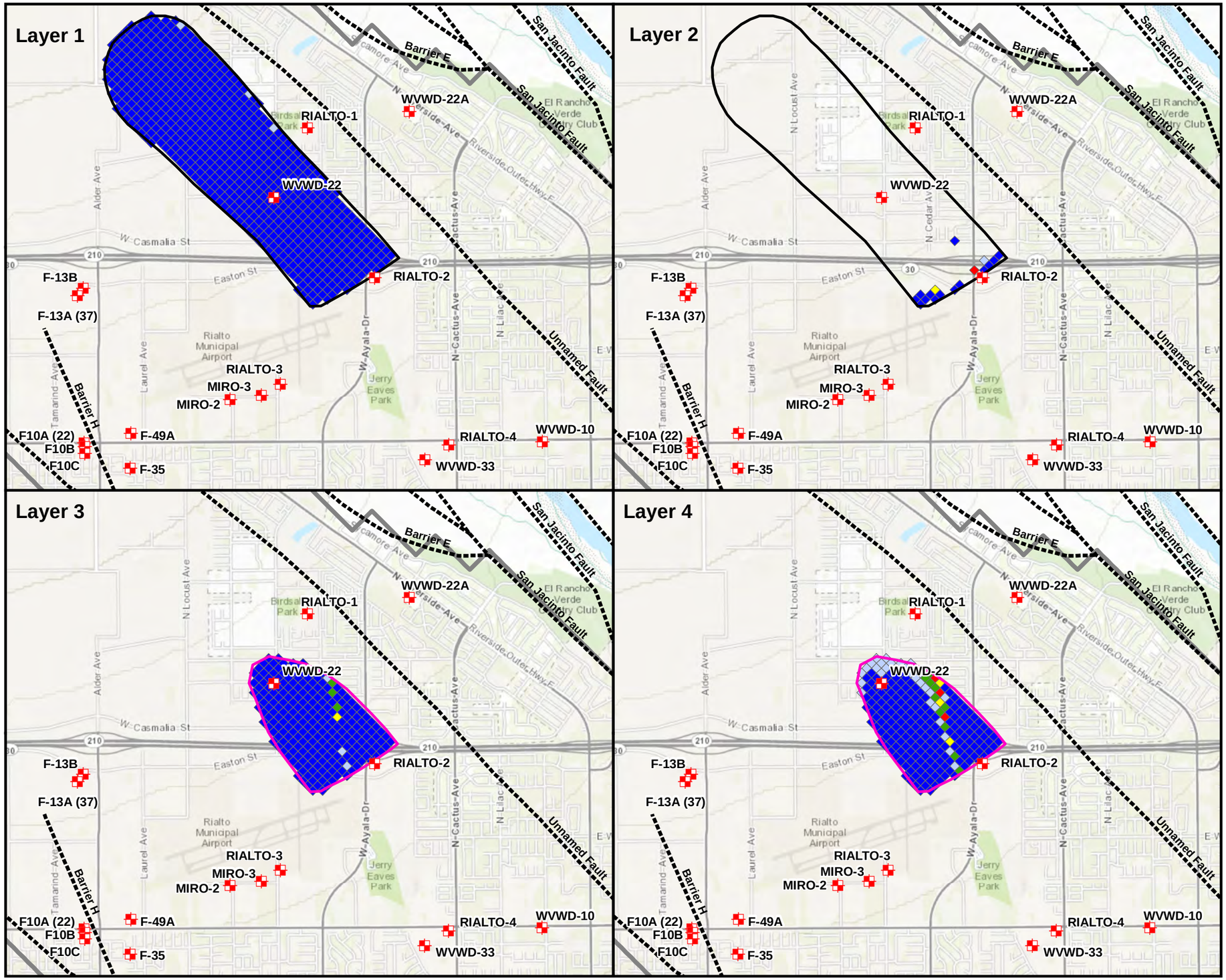
SCENARIO 1B
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_41.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_41.mxd WESAC CTALBOT 4/3/2013




## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate: Annual Average GPM | Annual Average AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 1,110 | 1,792 | 757 - 1,246 |
| Rialto-3 | 1,630 | 2,631 | 1,111 - 1,830 |
| Miro-2 | 815 | 1,315 | 555 - 915 |
| Miro-3 | 815 | 1,315 | 555 - 915 |
| Proposed Well 1 | 0 | 0 | 0 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 4,370 | 7,053 | 2,978 - 4,905 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-12

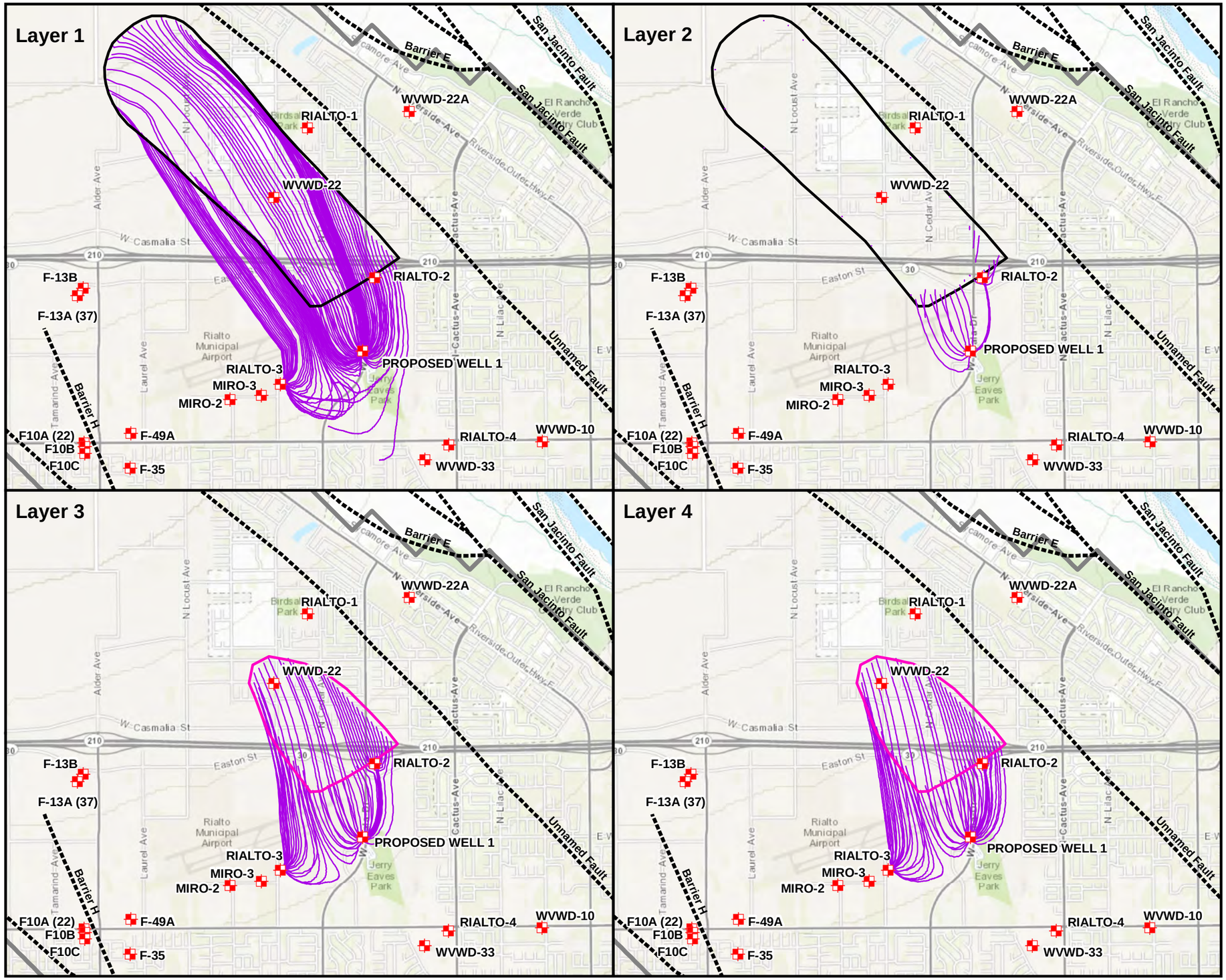
SCENARIO 1B
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_42.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_42.mxd WESAC CTALBOT 4/3/2013




## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 310 | 500 | 211 - 348 |
| Rialto-3 | 1,425 | 2,300 | 971 - 1,600 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,549 | 2,500 | 1,055 - 1,739 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,284 | 5,300 | 2,238 - 3,686 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-13

SCENARIO 2A
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_45.mxd

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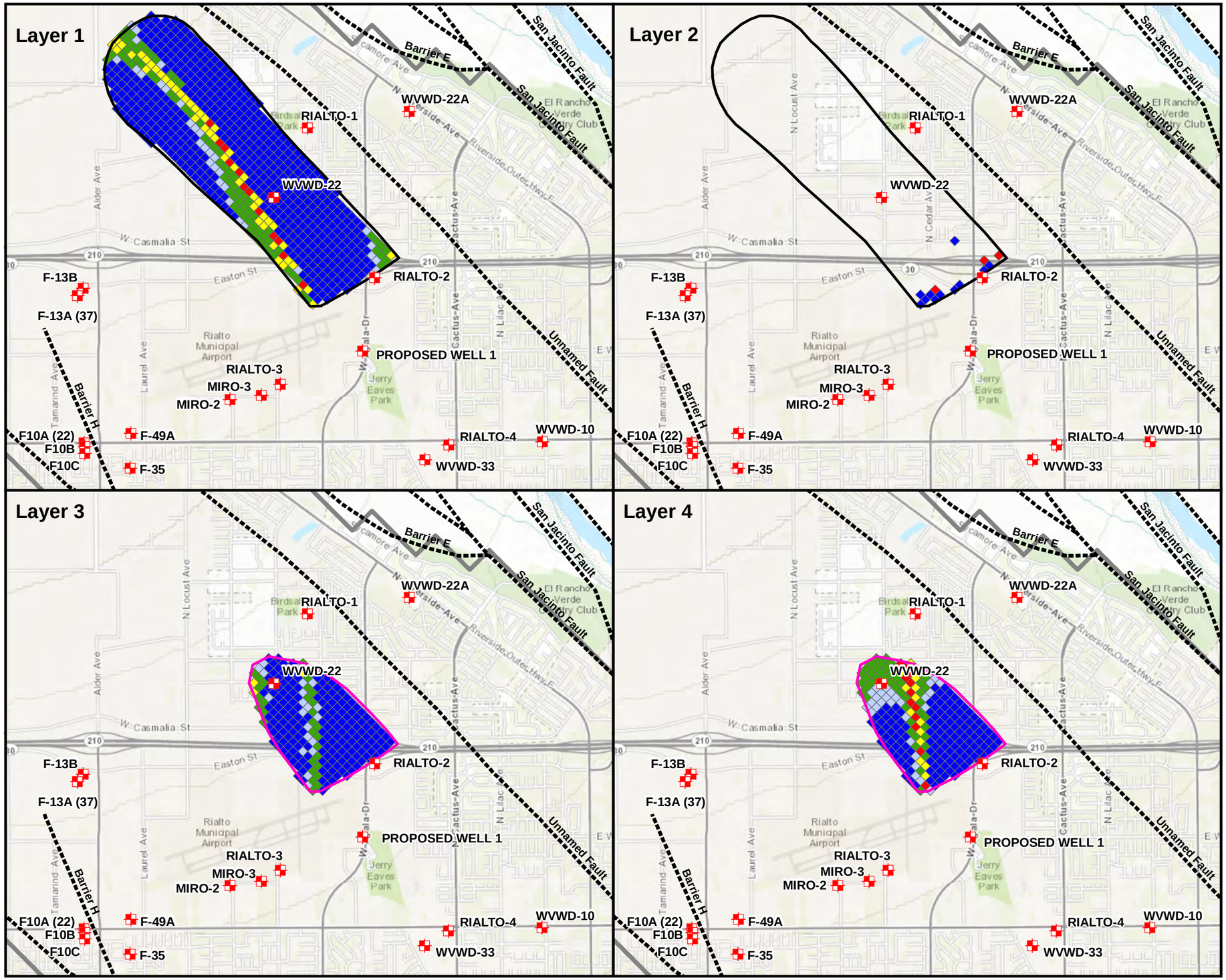


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 310 | 500 | 211 - 348 |
| Rialto-3 | 1,425 | 2,300 | 971 - 1,600 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,549 | 2,500 | 1,055 - 1,739 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,284 | 5,300 | 2,238 - 3,686 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-14

SCENARIO 2A
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_46.mxd

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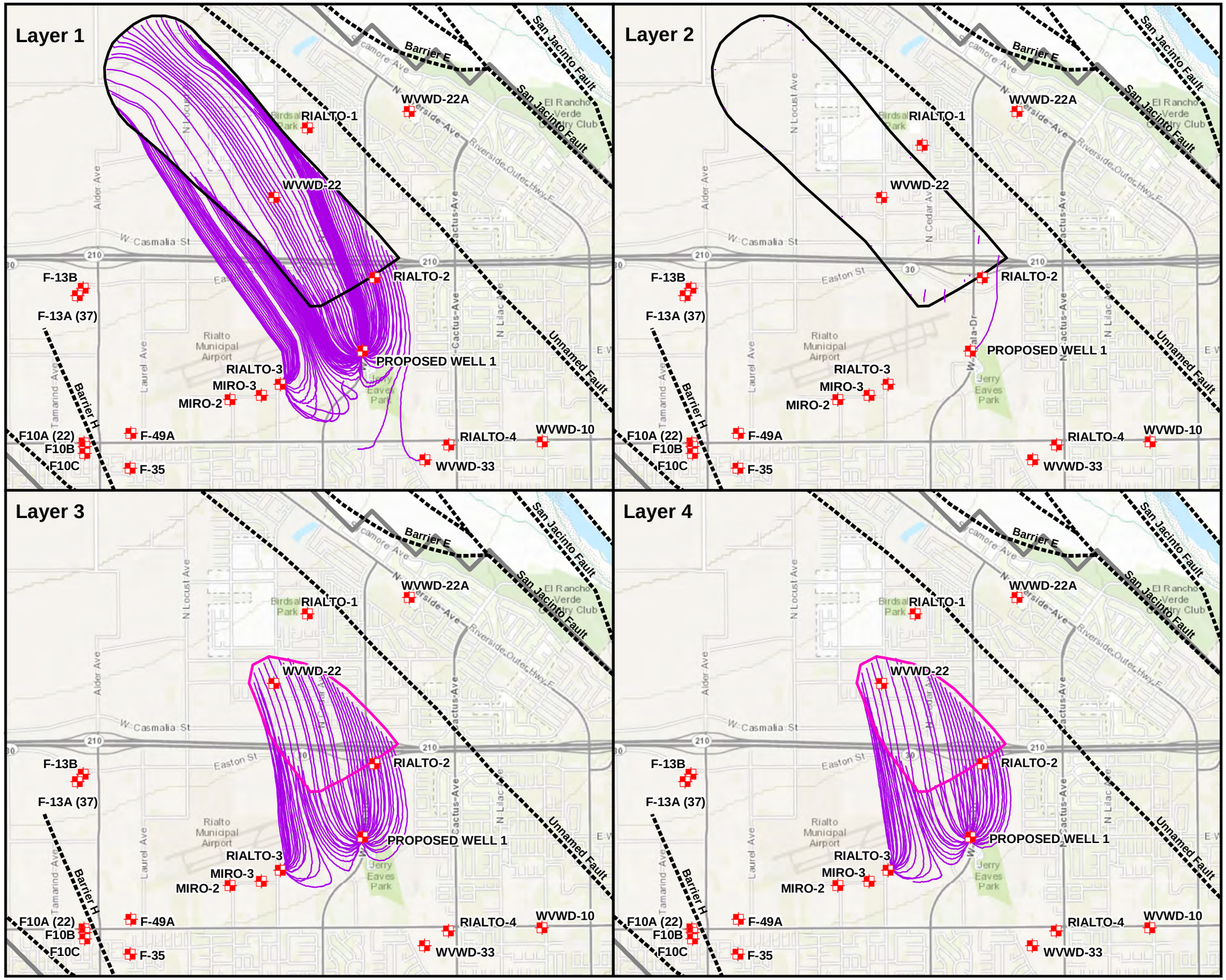


## Legend

- Production Well
- Faults
- Model Particle Tracks
- Regional Aquifer Target Capture Zone
- Intermediate Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-15

SCENARIO 2B
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_49-edit.mxd

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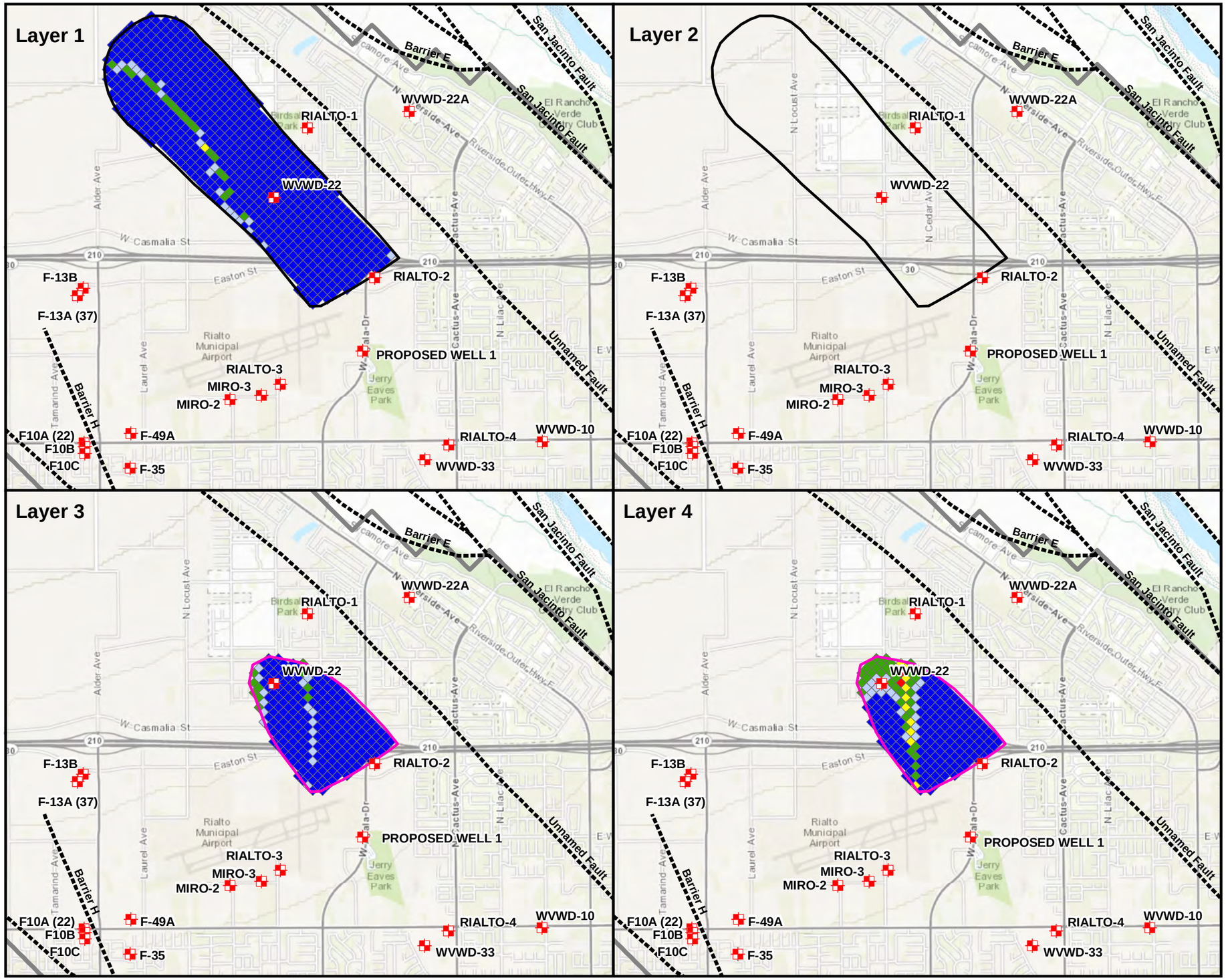


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-16

SCENARIO 2B
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_50.mxd

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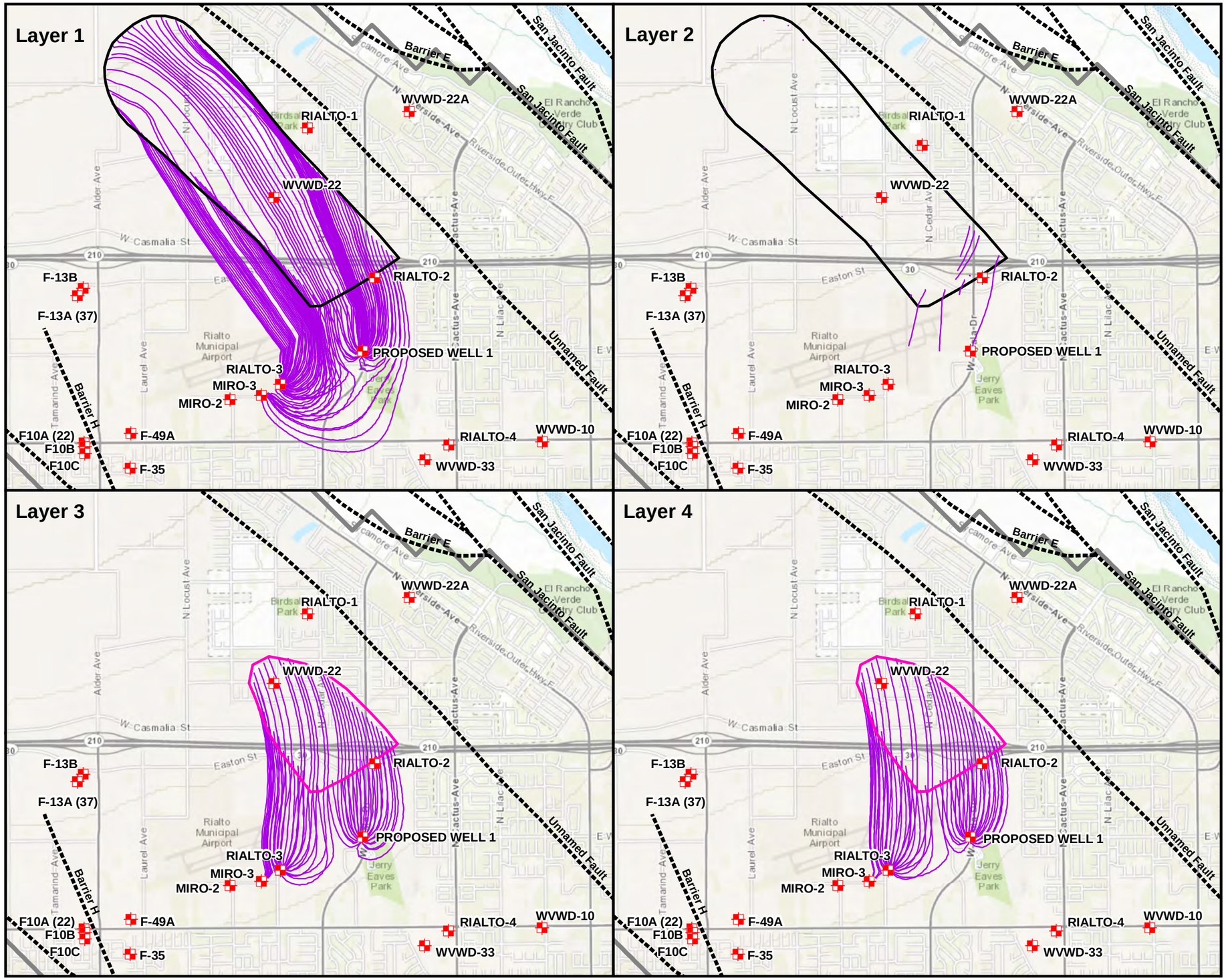


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 800 | 1,291 | 545 - 898 |
| Miro-3 | 800 | 1,291 | 545 - 898 |
| Proposed Well 1 | 1,250 | 2,018 | 852 - 1,404 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 4,007 | 6,468 | 2,731 - 4,498 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-17

SCENARIO 2C
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_53.mxd

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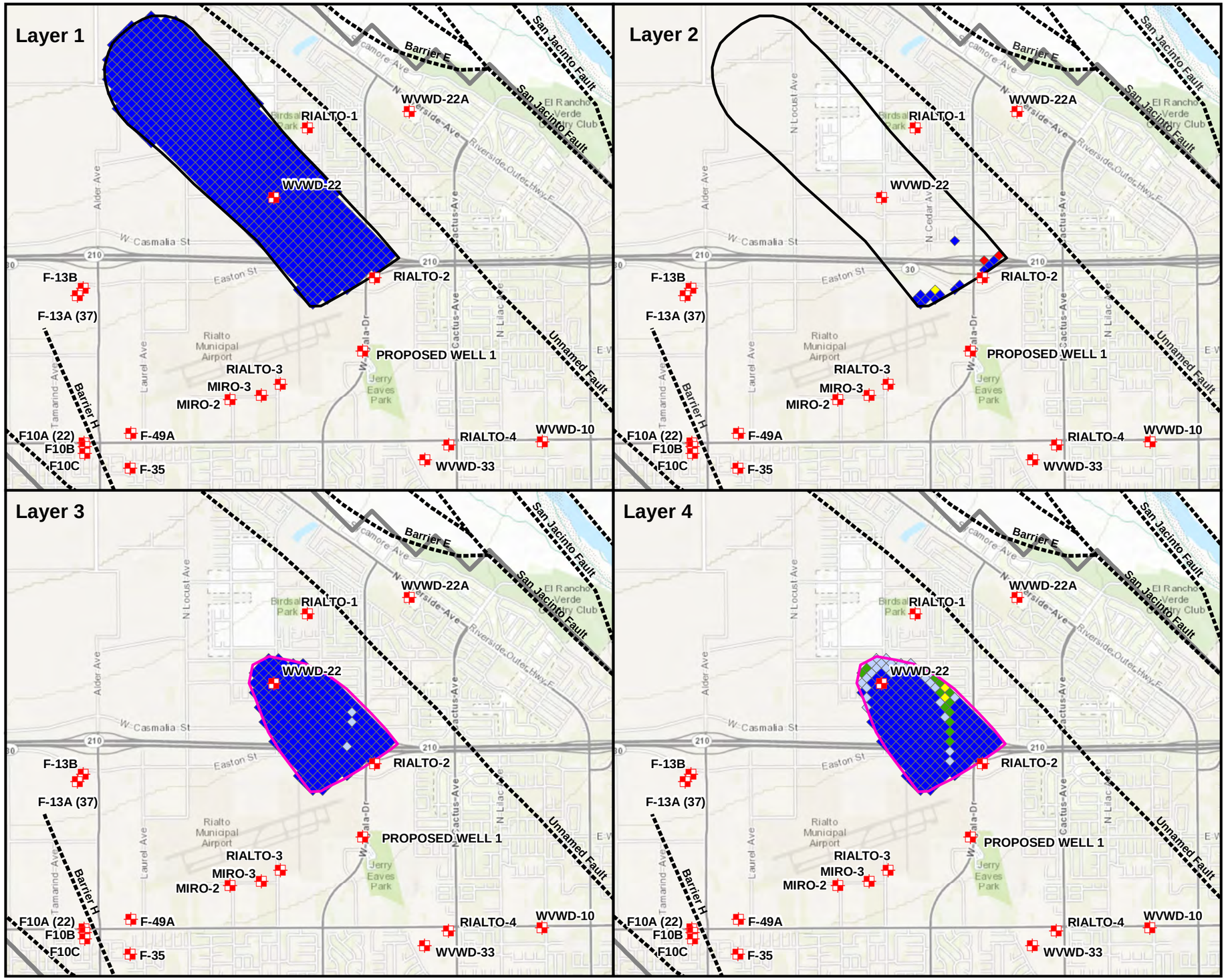



## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 800 | 1,291 | 545 - 898 |
| Miro-3 | 800 | 1,291 | 545 - 898 |
| Proposed Well 1 | 1,250 | 2,018 | 852 - 1,404 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 4,007 | 6,468 | 2,731 - 4,498 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-18

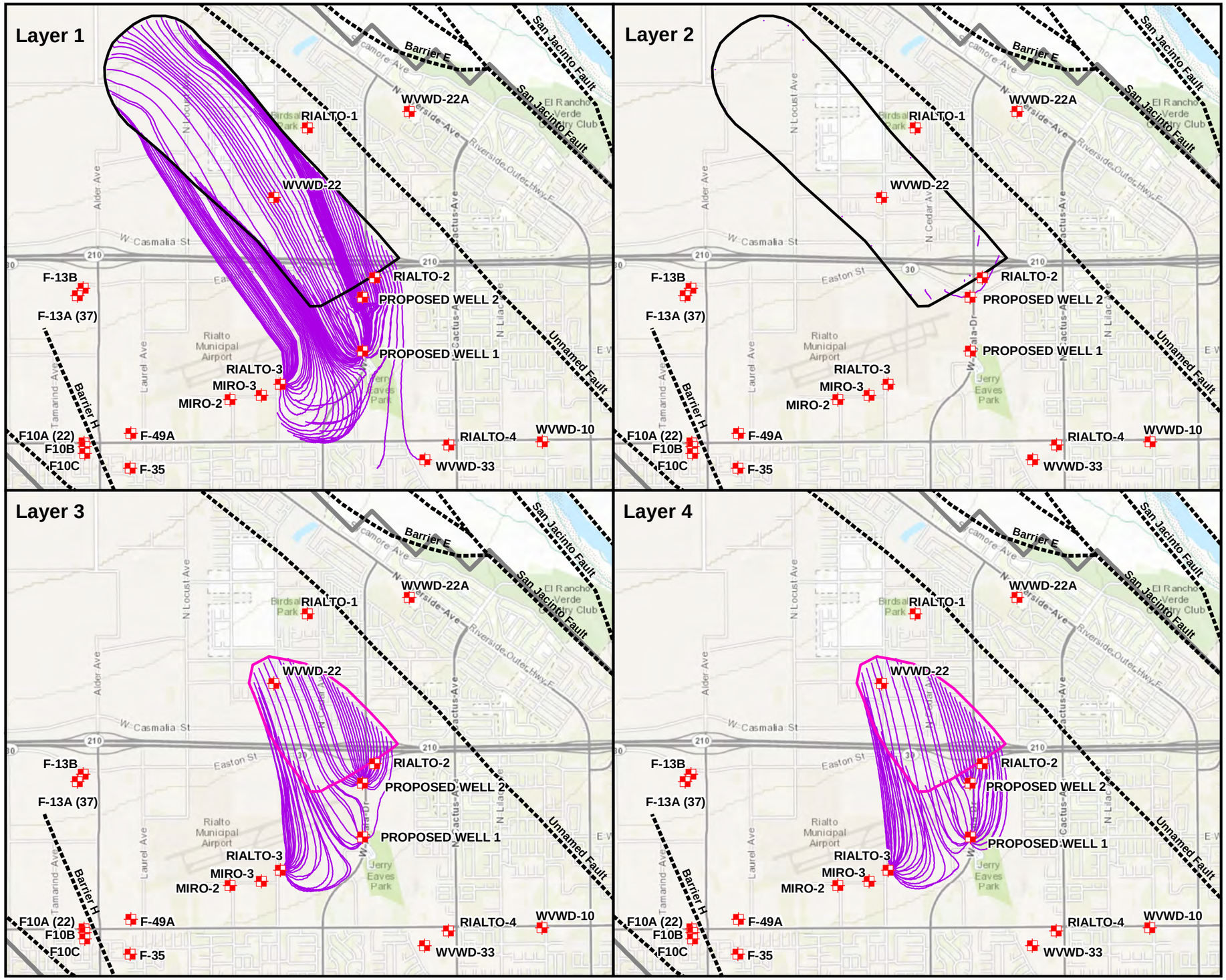
SCENARIO 2C
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_54.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_54.mxd WESAC CTALBOT 4/3/2013




## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-19

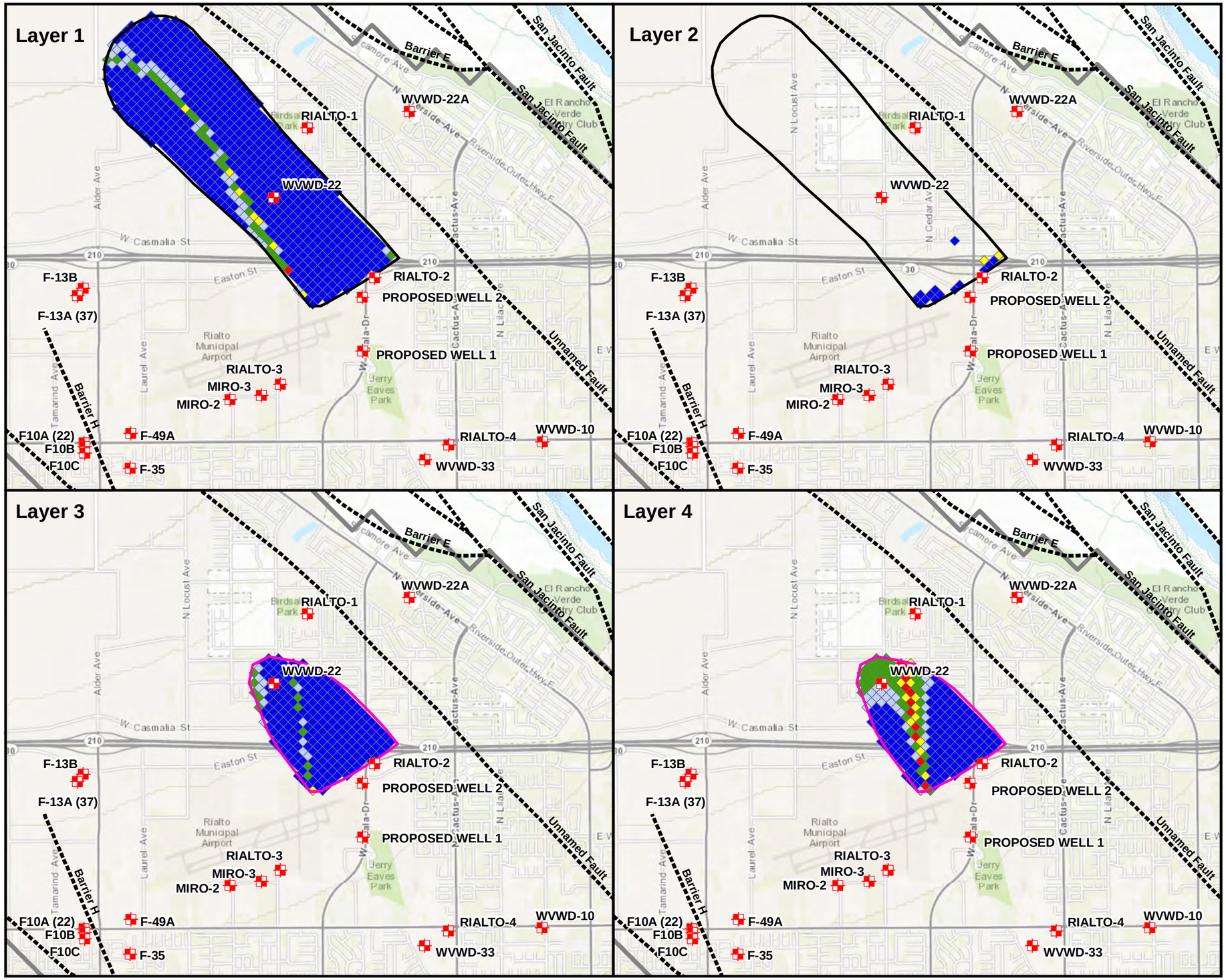
SCENARIO 2D-1
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_57.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_57.mxd WESAC CTALBOT 4/3/2013




## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-20

SCENARIO 2D-1
FREQUENCY OF CAPTURE

ERM

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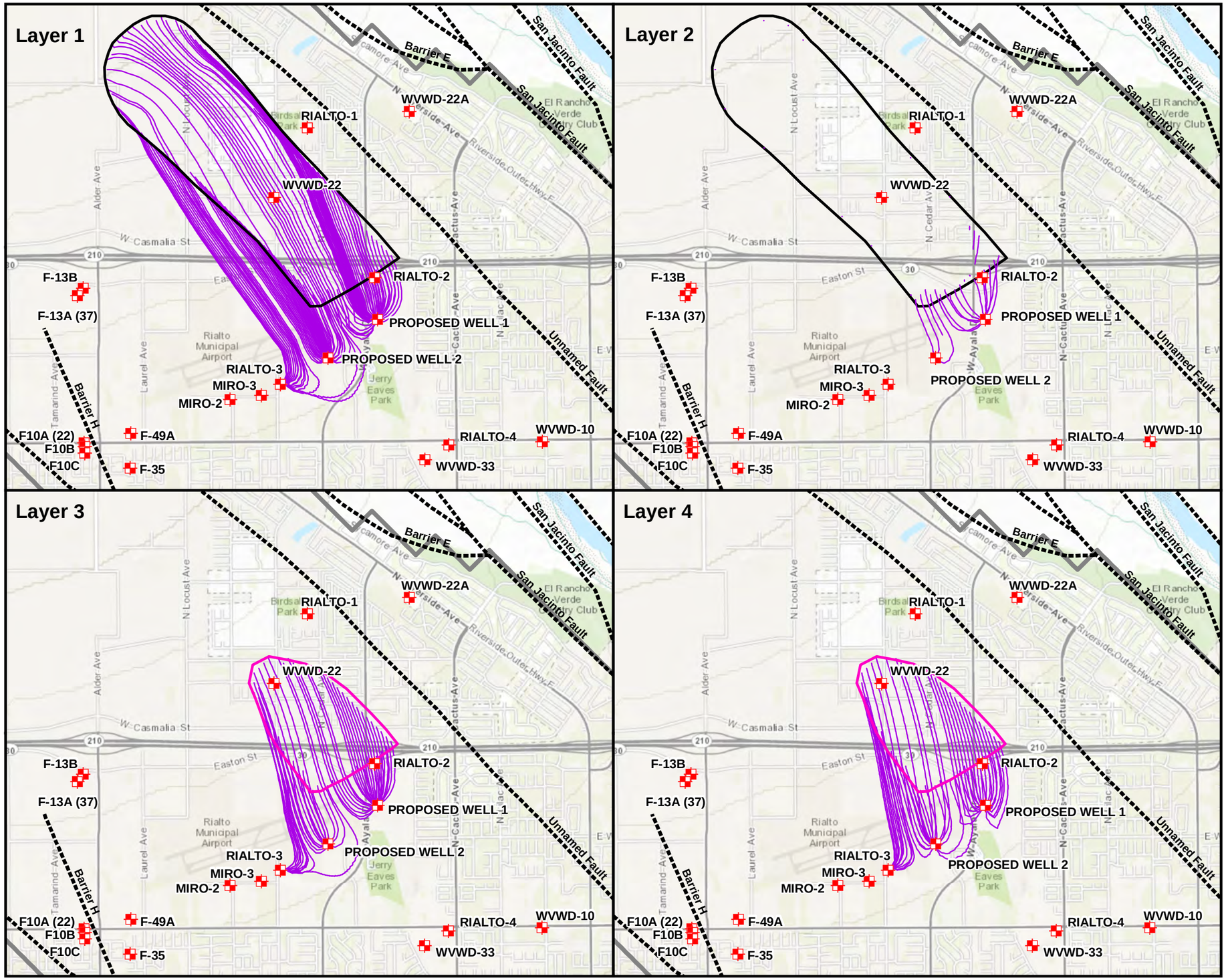
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_58.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_58.mxd WESAC CTALBOT 4/3/2013




## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-21

SCENARIO 2D-2
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
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JOB NO. 0179962.03.A
FILE: 0179962_61.mxd

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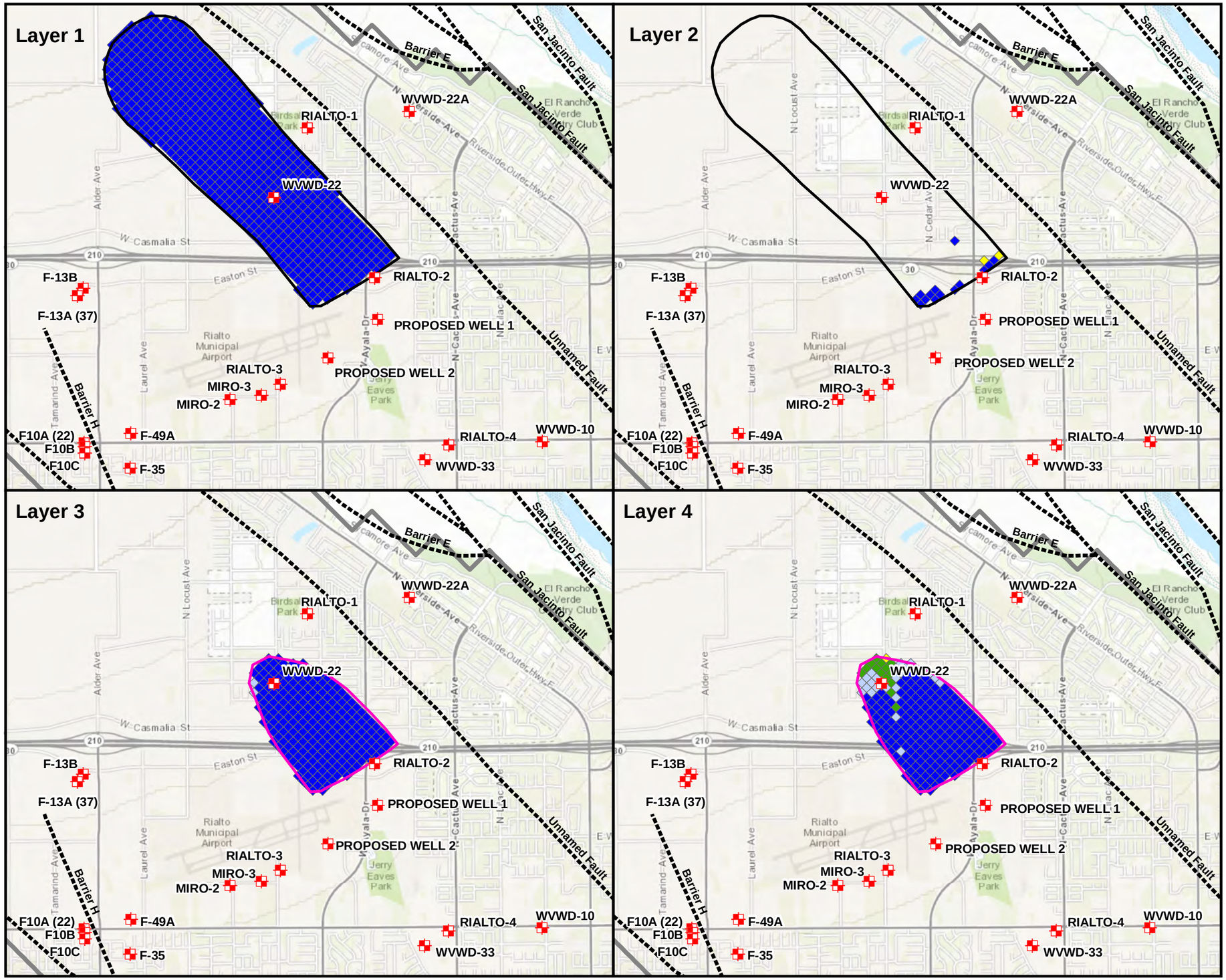


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-22

SCENARIO 2D-2
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_62.mxd

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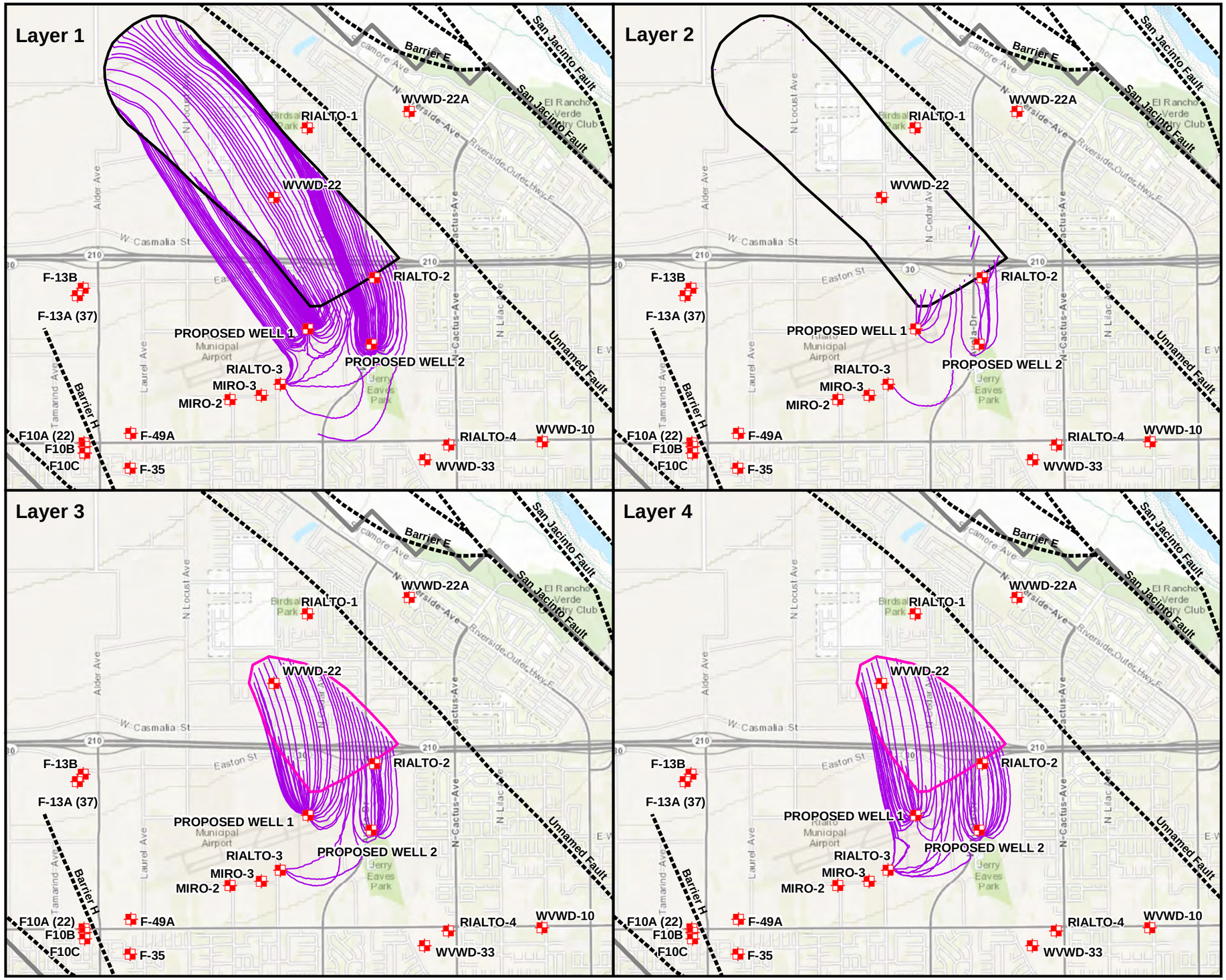


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-23

SCENARIO 2D-3
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
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JOB NO. 0179962.03.A
FILE: 0179962_65.mxd

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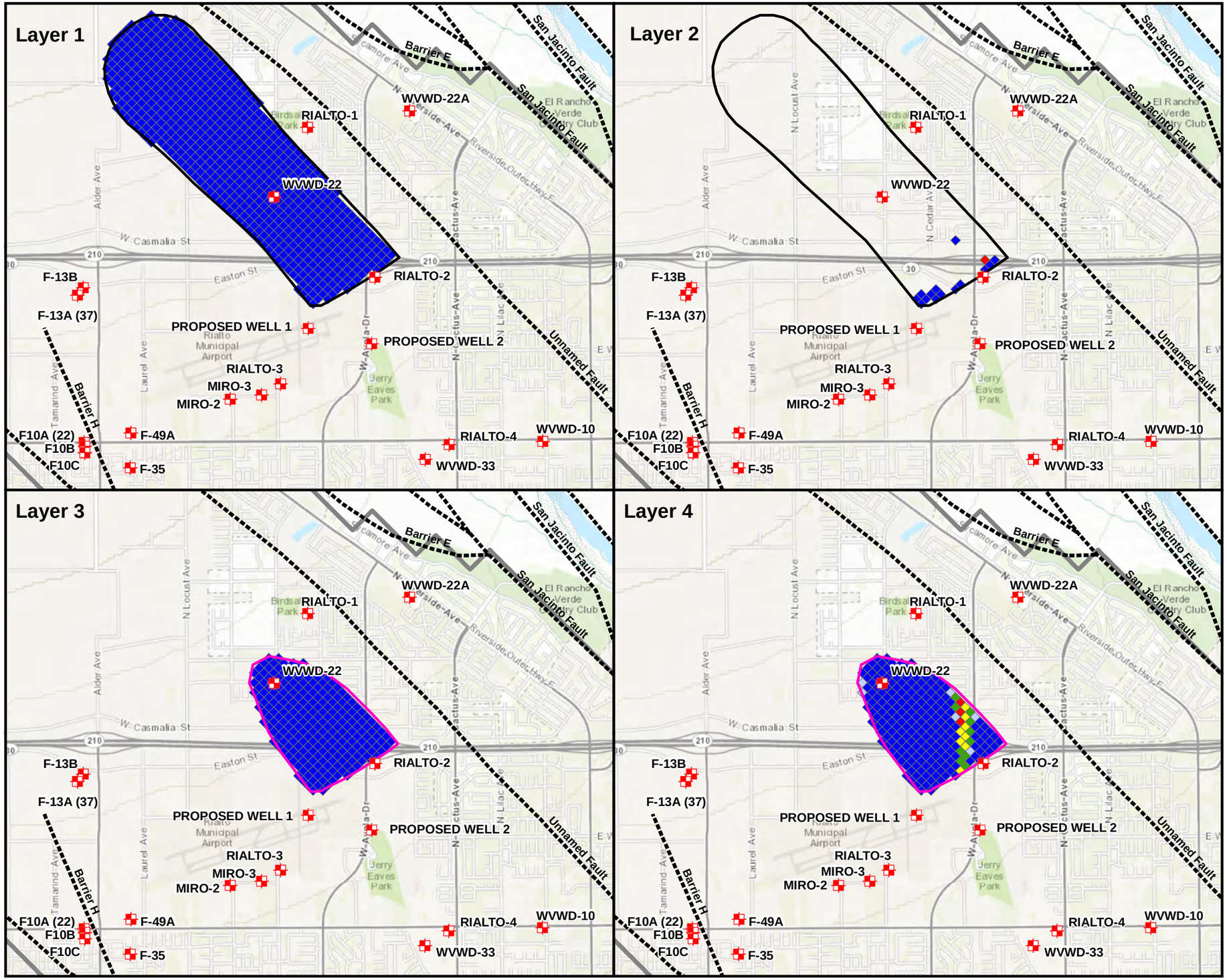


## Legend

- Production Well

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-24

SCENARIO 2D-3
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_66.mxd

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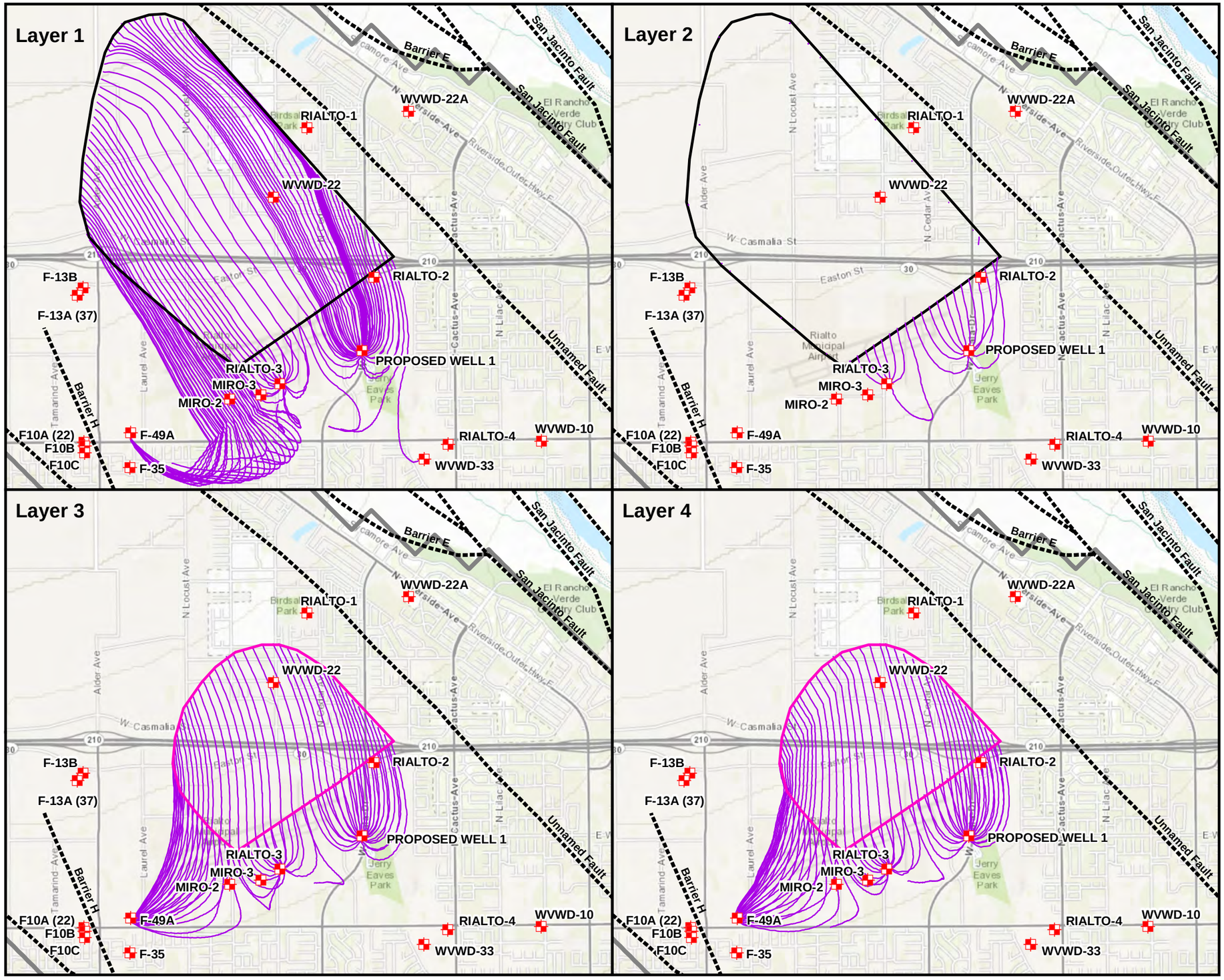


## Legend

- Production Well
- Faults
- Model Particle Tracks
- Regional Aquifer Target Capture Zone
- Intermediate Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-25

COMBINED CAPTURE - SCENARIO 2B
PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_125.mxd

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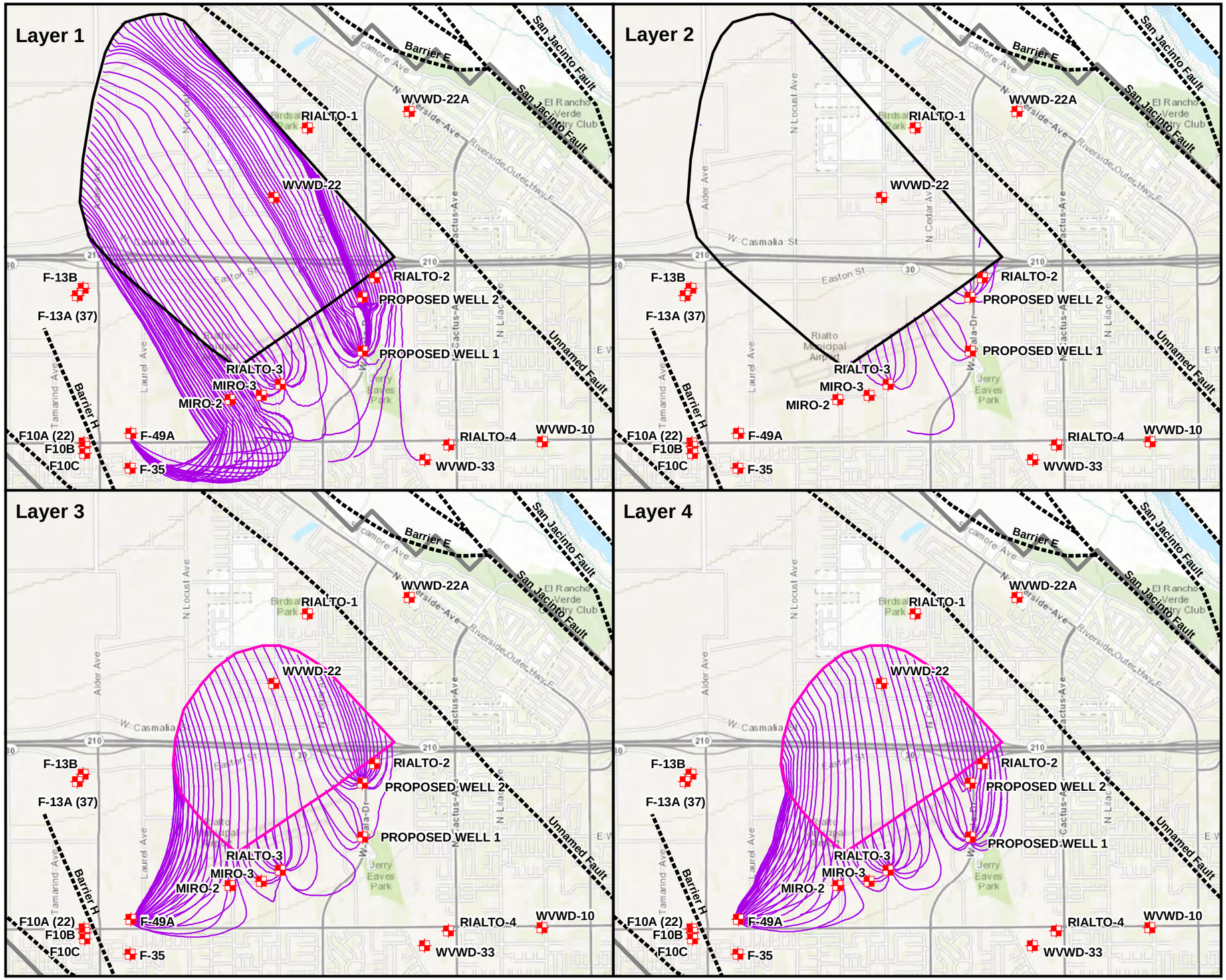


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-26

COMBINED CAPTURE - SCENARIO 2D-1 PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_126.mxd

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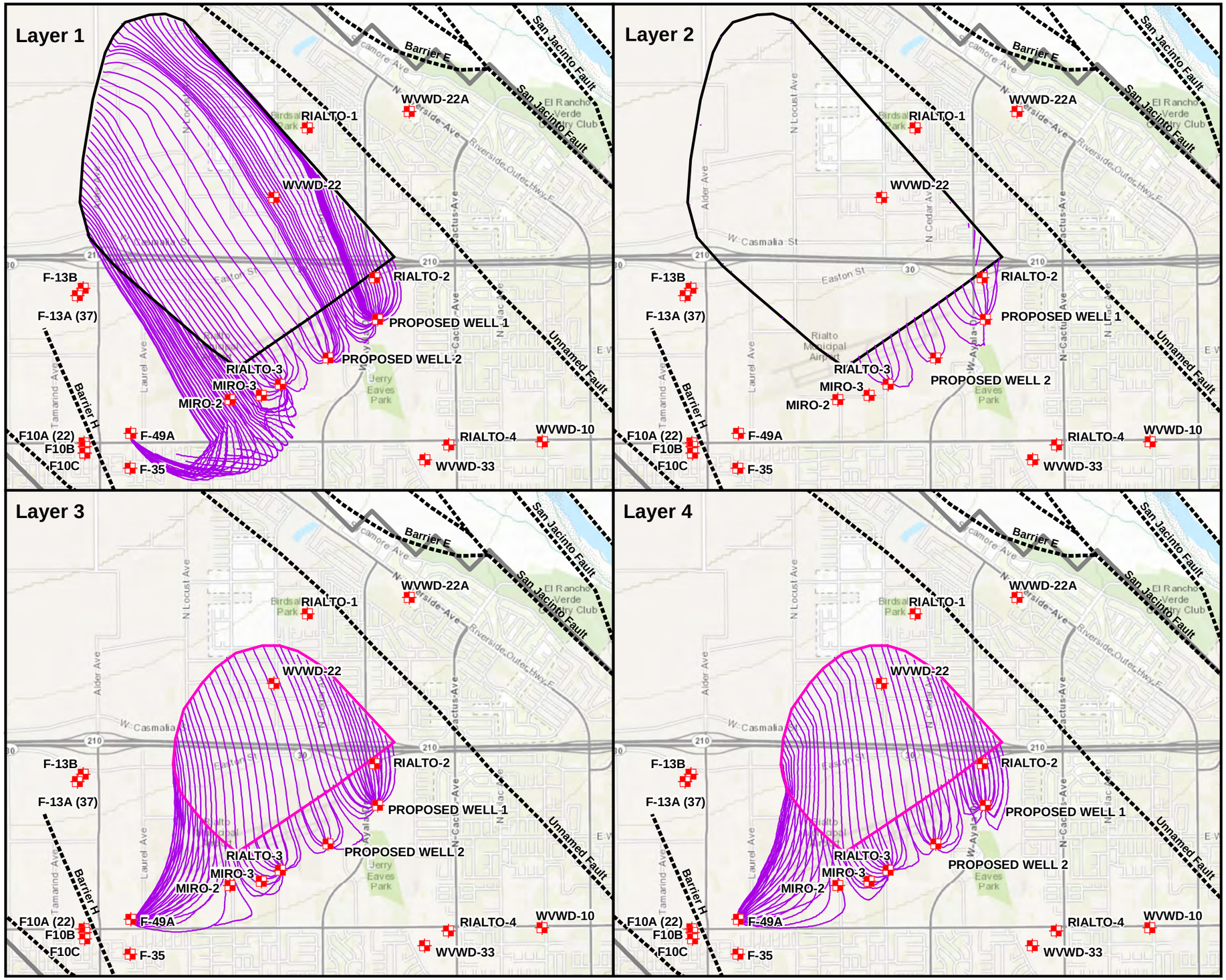


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-27

COMBINED CAPTURE - SCENARIO 2D-2 PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

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FILE: 0179962_127.mxd

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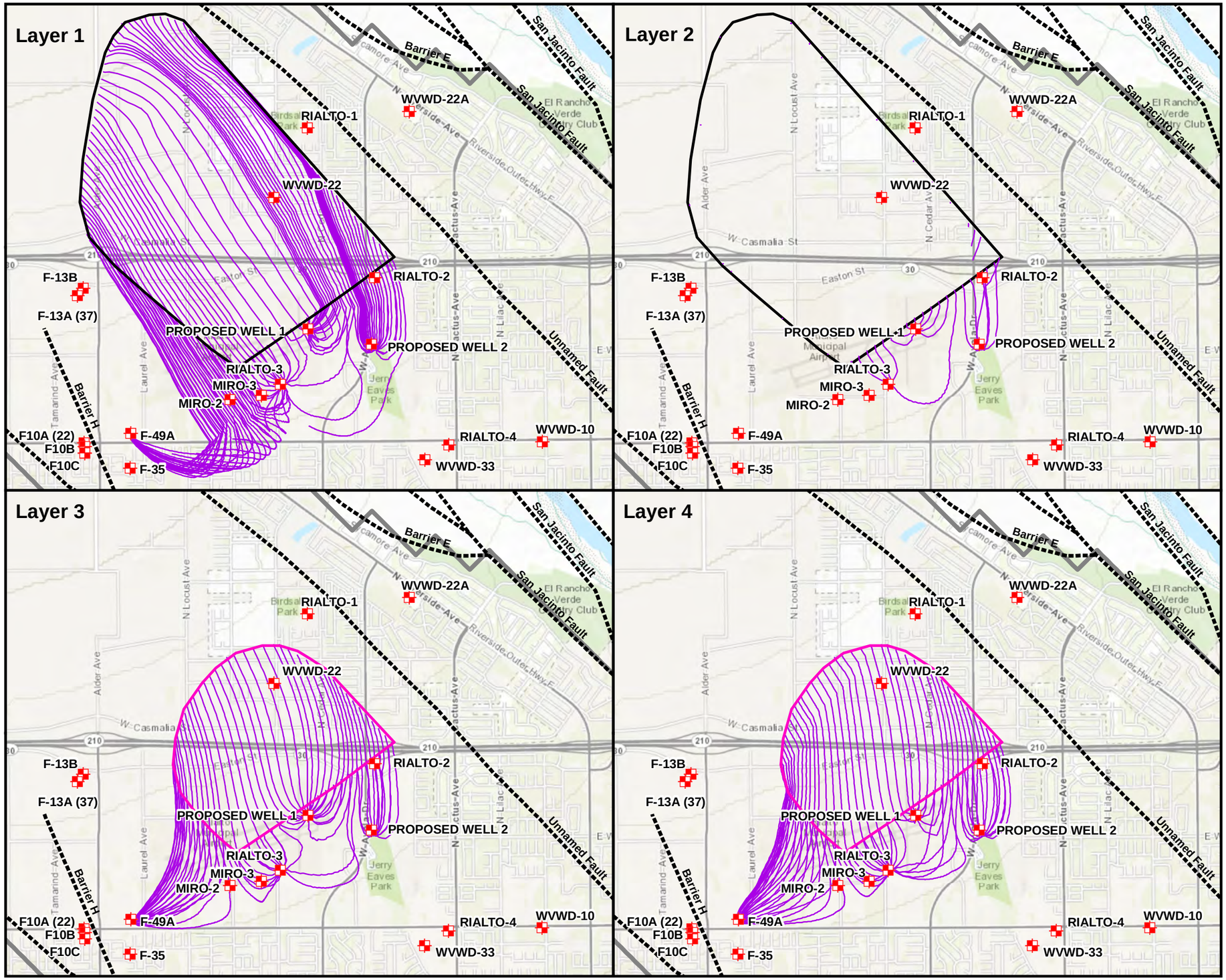


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-28

COMBINED CAPTURE
SCENARIO 2D-3
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_128.mxd

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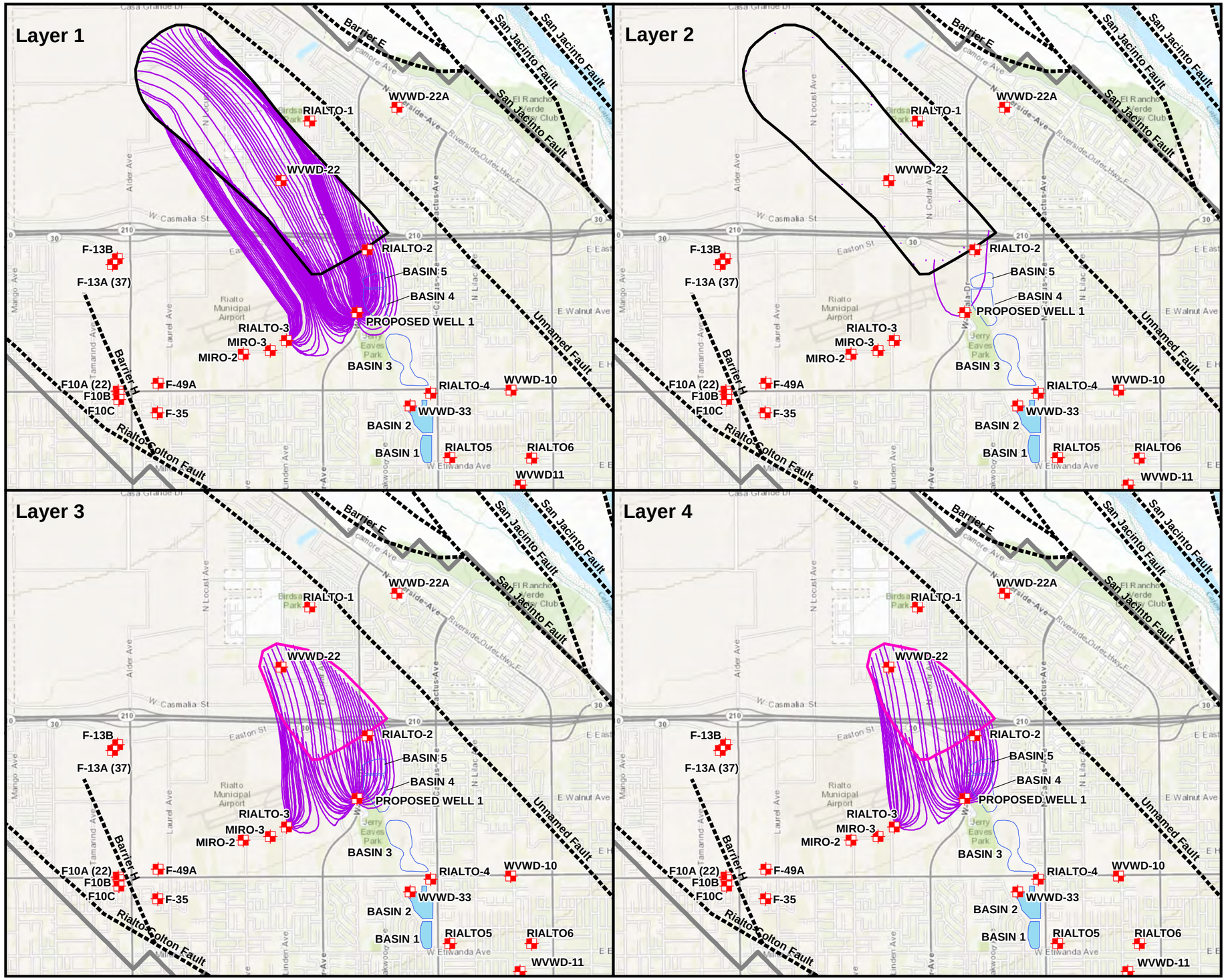


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-29

SCENARIO 3A - 2B PARTICLE TRACK SIMULATION WITH CACTUS BASINS 1 & 2 RECHARGE

ERM

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JOB NO. 0179962.03.A
FILE: 0179962_69.mxd

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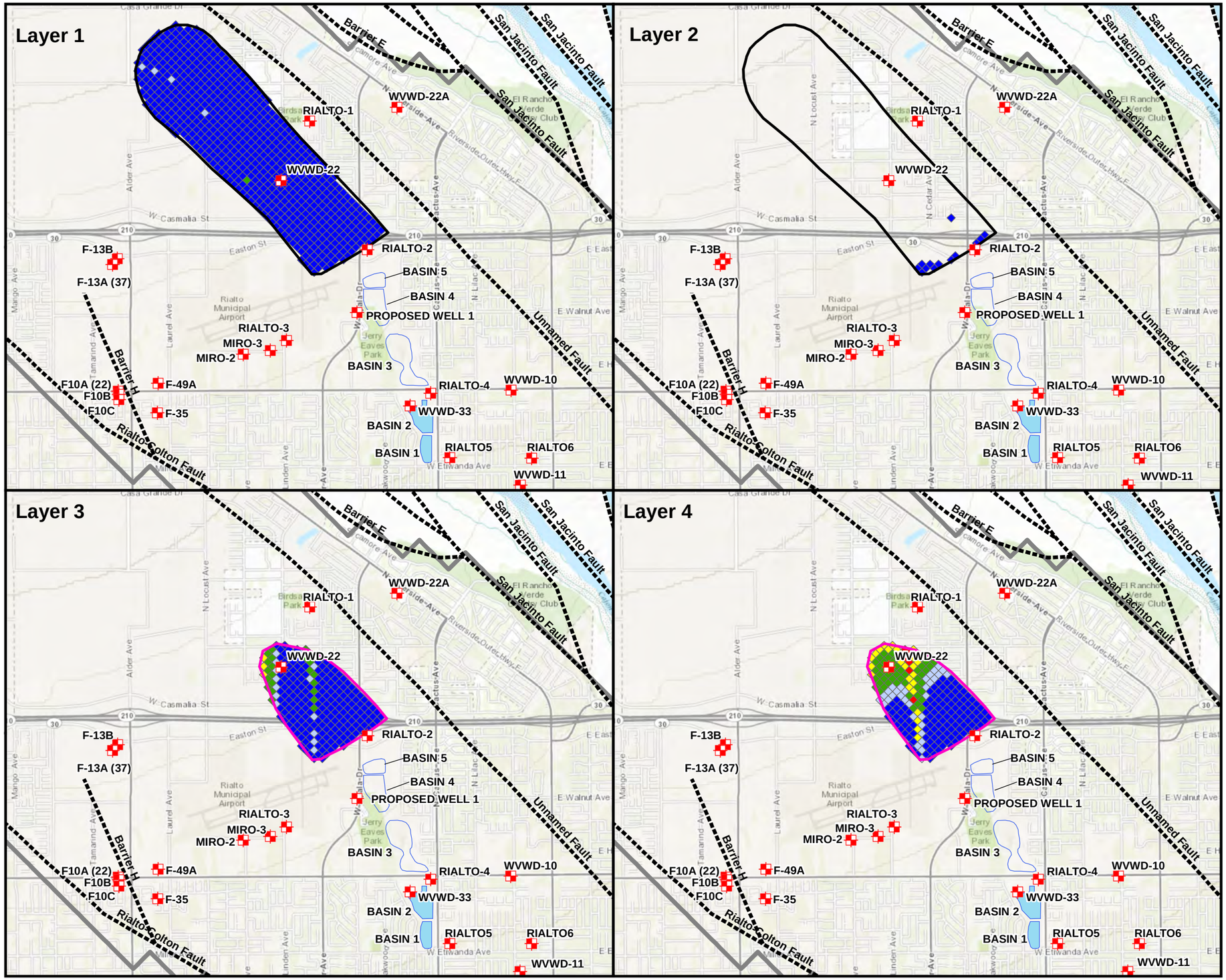


## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-30

SCENARIO 3A - 2B FREQUENCY OF CAPTURE WITH CACTUS BASINS 1 & 2 RECHARGE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_70.mxd

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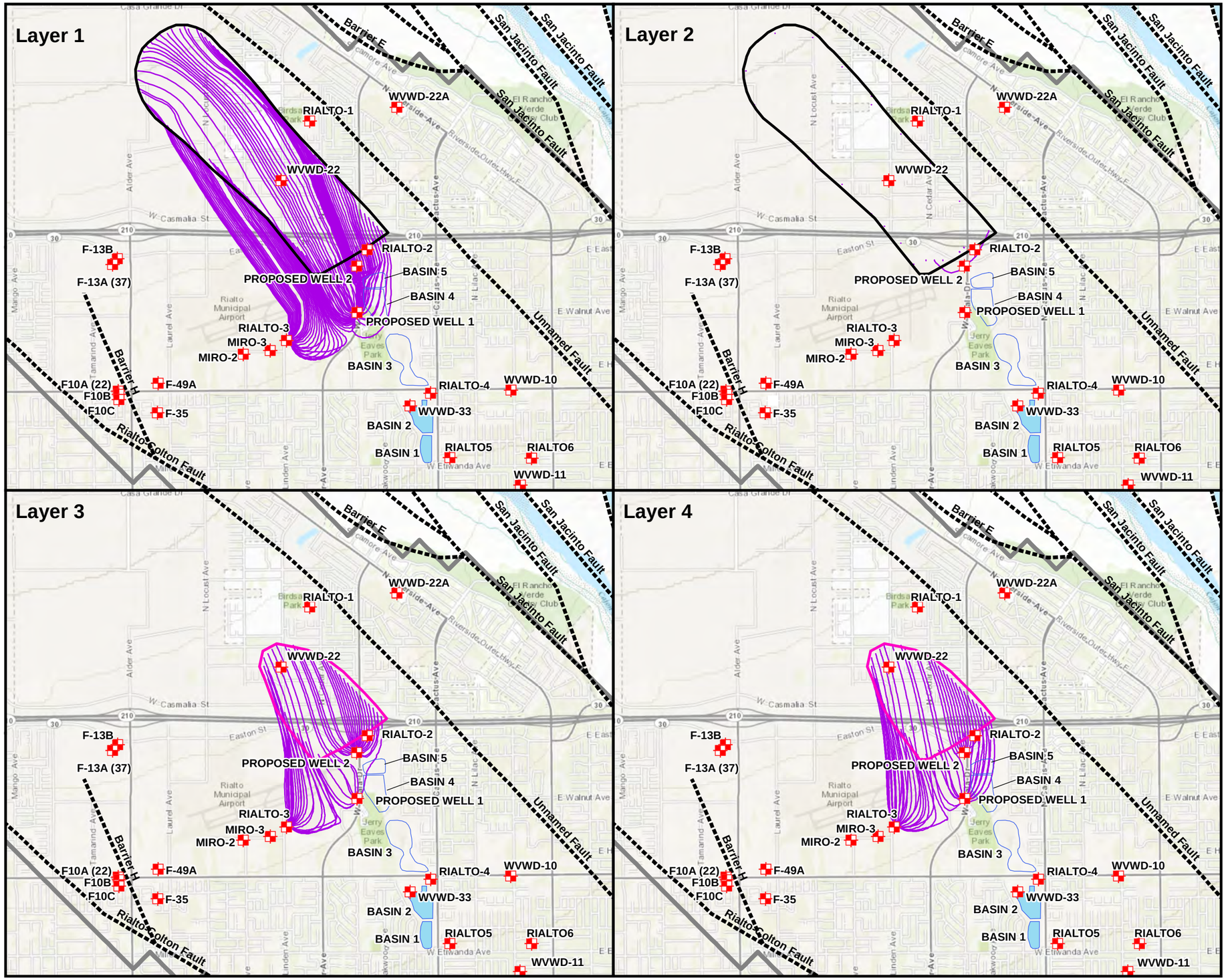


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-31

SCENARIO 3A - 2D-1 PARTICLE TRACK SIMULATION WITH CACTUS BASINS 1 & 2 RECHARGE

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_71.mxd

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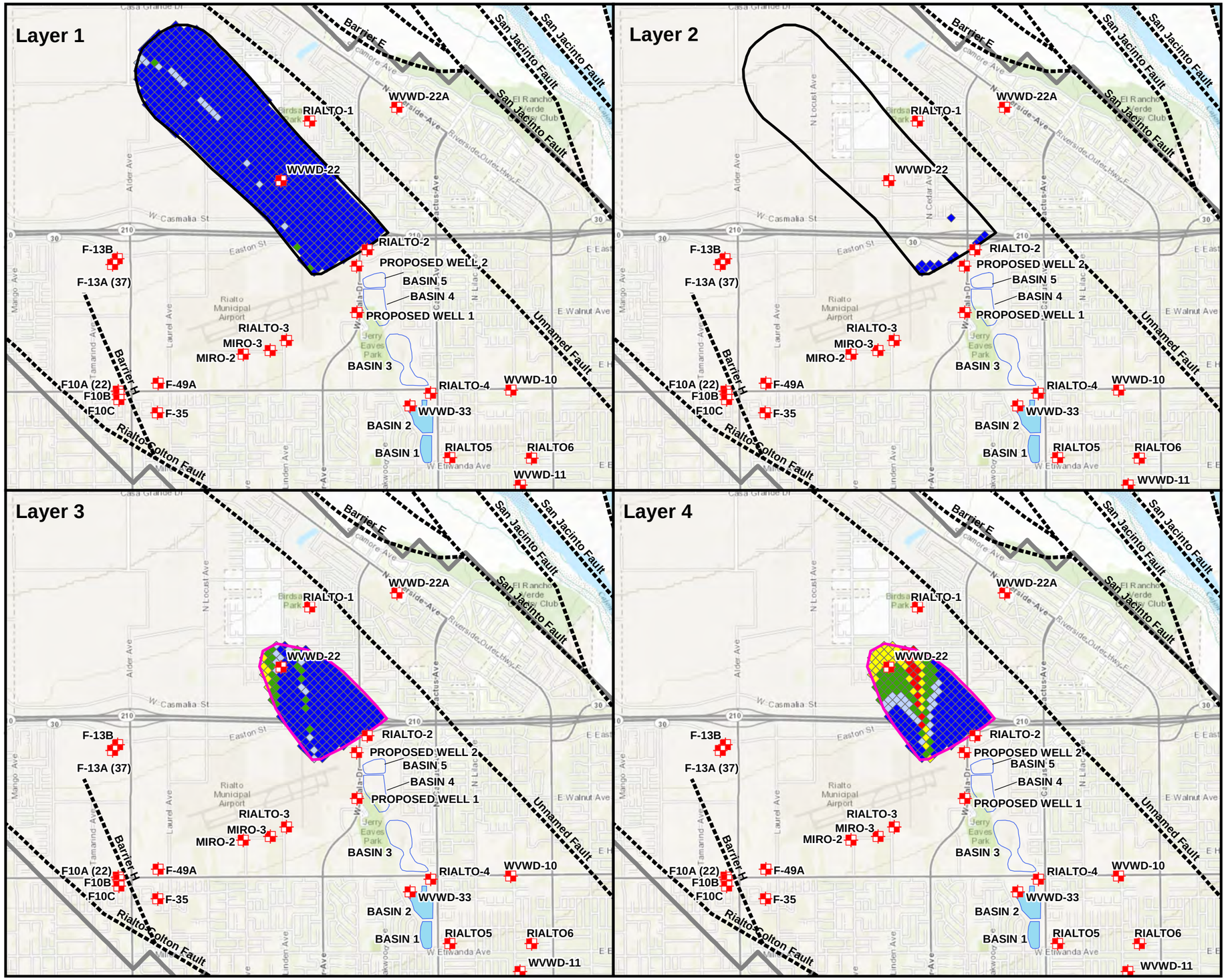


## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-32

SCENARIO 3A - 2D-1
FREQUENCY OF CAPTURE WITH
CACTUS BASINS 1 & 2 RECHARGE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_72.mxd

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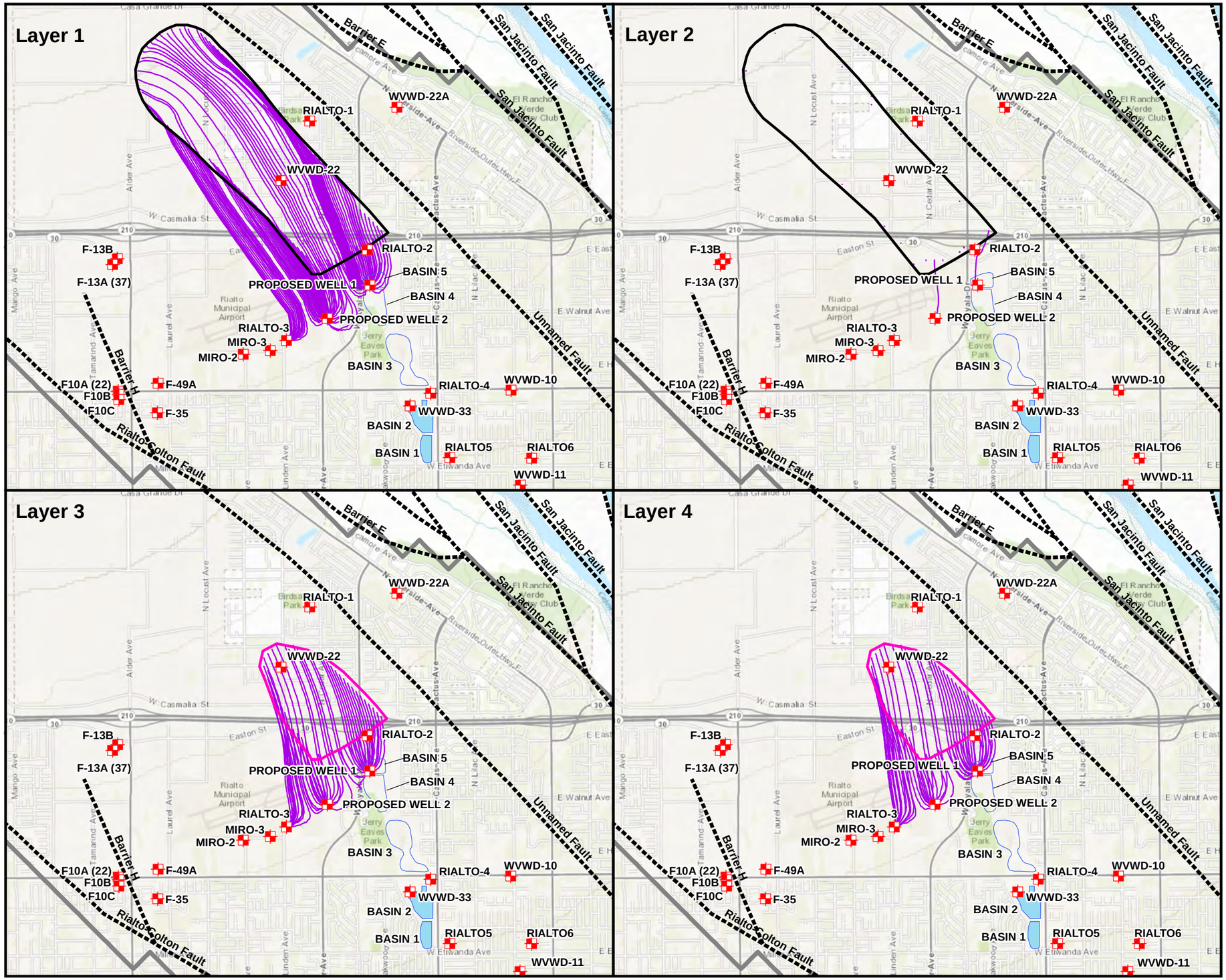



## Legend

- Production Well
- Model Particle Tracks
- Faults
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-33

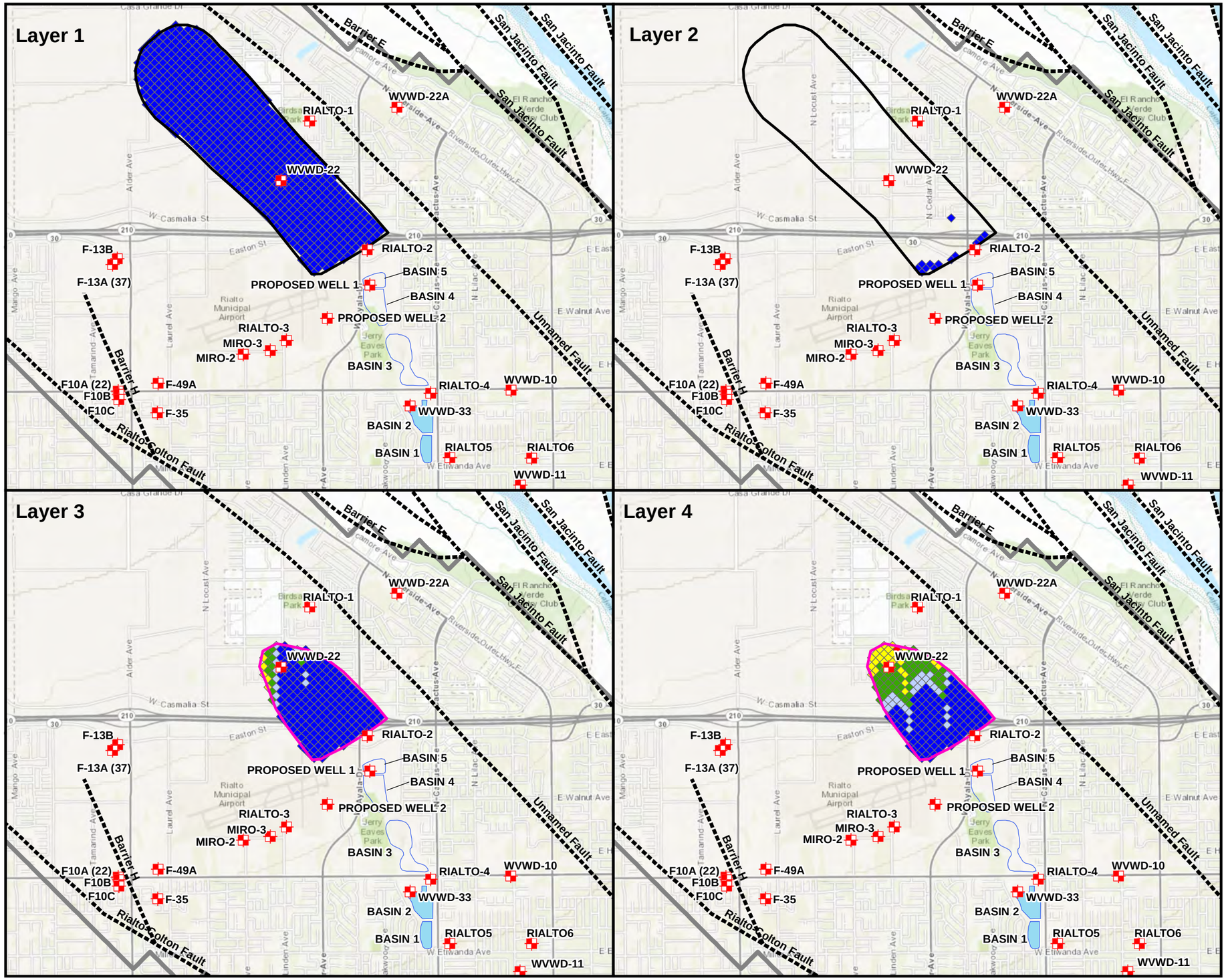
SCENARIO 3A - 2D-2 PARTICLE TRACK SIMULATION WITH CACTUS BASINS 1 & 2 RECHARGE

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_129.mxd

F:\ERM Files\GIS\0179962\ArcMaps\0179962_129.mxd WESAC CTALBOT 4/3/2013




## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-34

SCENARIO 3A - 2D-2 FREQUENCY OF CAPTURE WITH CACTUS BASINS 1 & 2 RECHARGE

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_130.mxd

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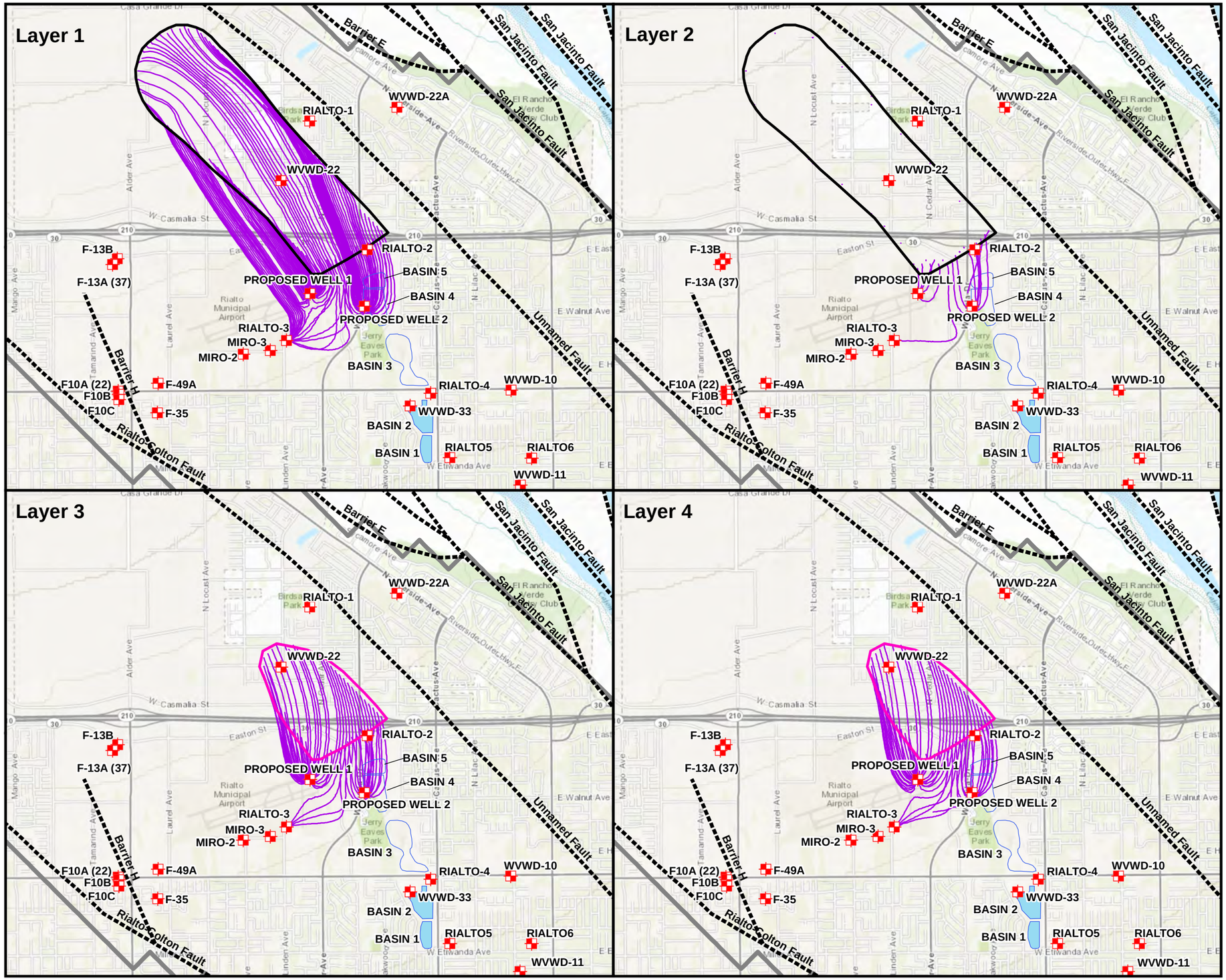


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-35

SCENARIO 3A - 2D-3 PARTICLE TRACK SIMULATION WITH CACTUS BASINS 1 & 2 RECHARGE

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_131.mxd

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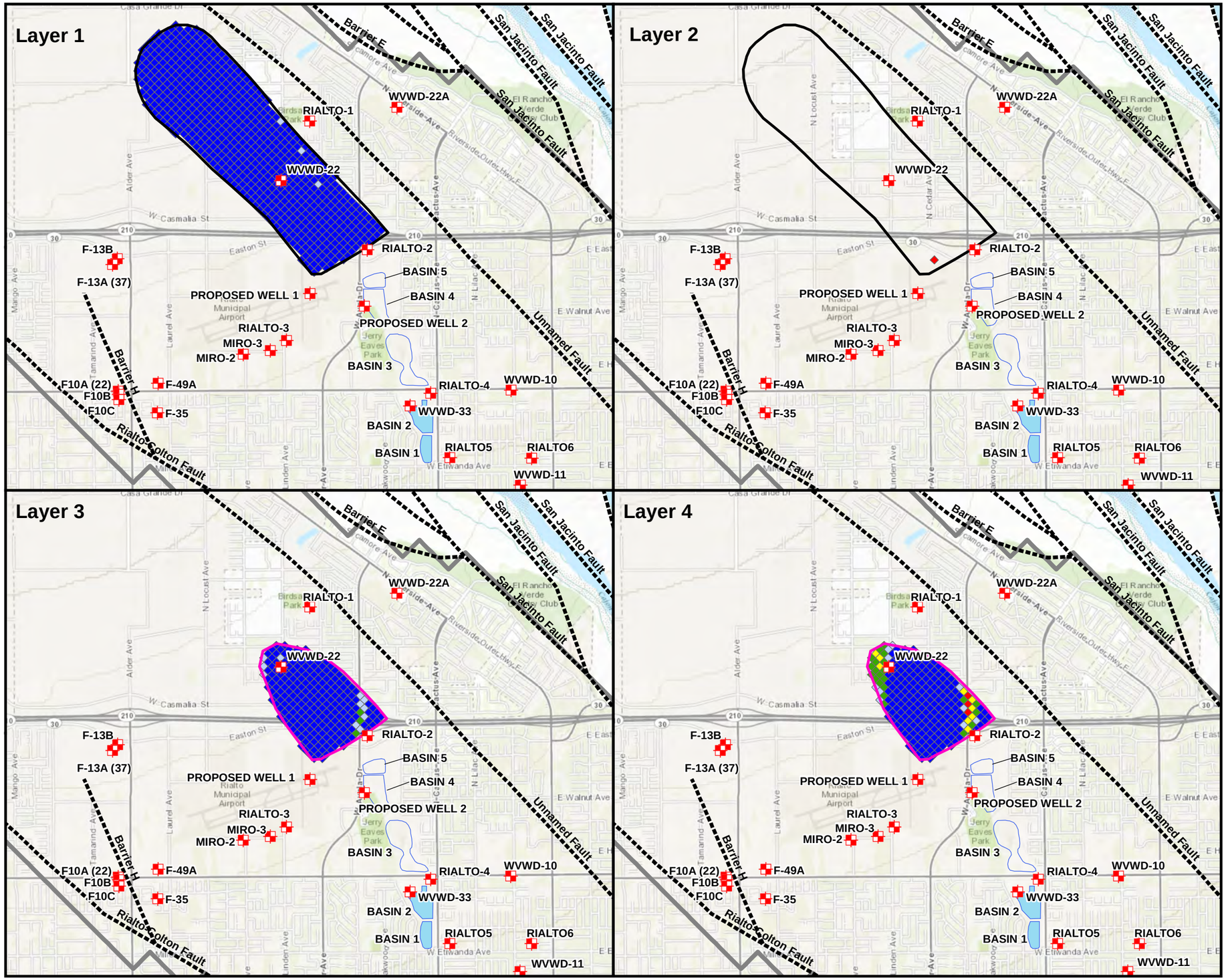


## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-36

SCENARIO 3A - 2D-3 FREQUENCY OF CAPTURE WITH CACTUS BASINS 1 & 2 RECHARGE

ERM

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JOB NO. 0179962.03.A
FILE: 0179962_132.mxd

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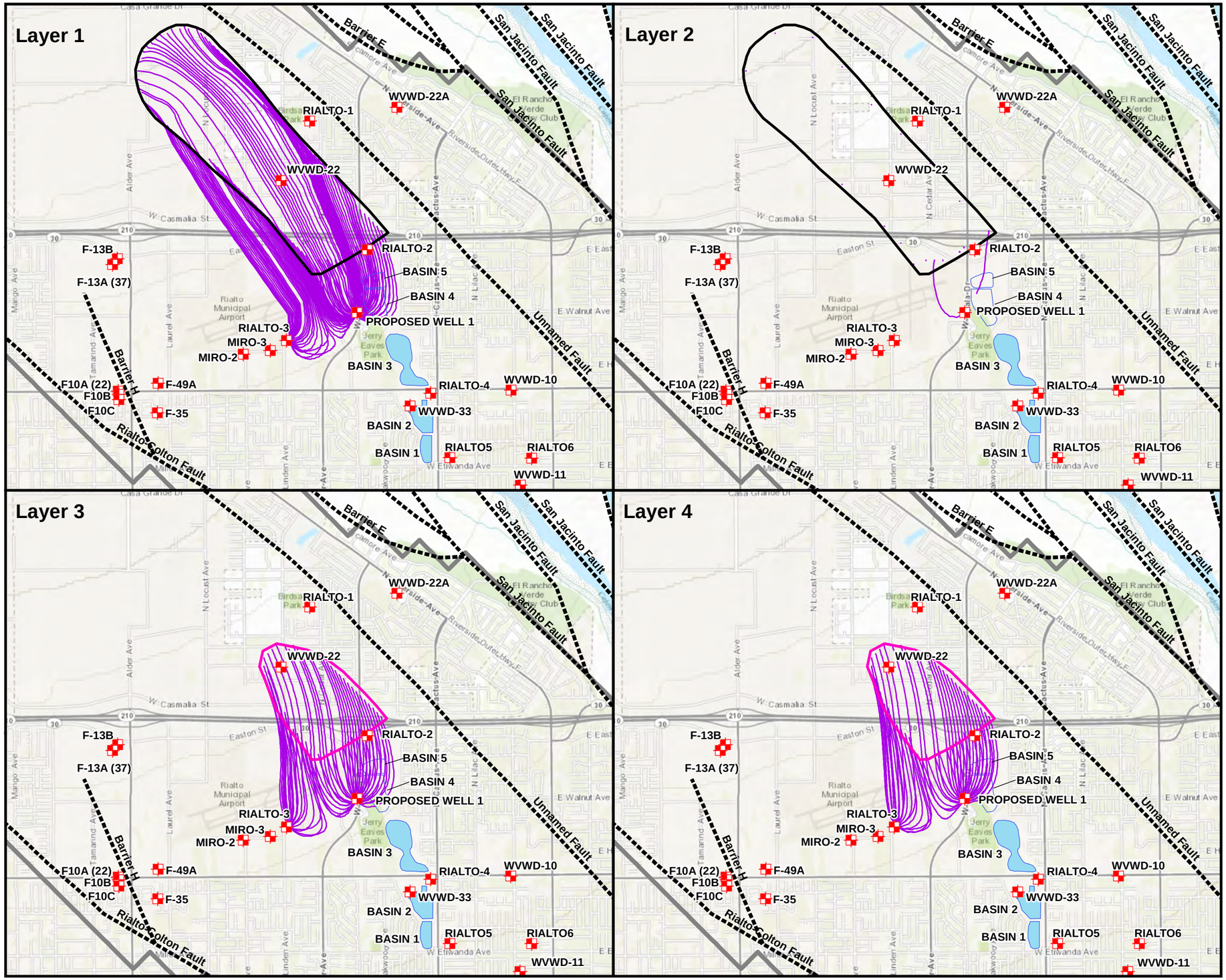


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Detention Basins in Simulation
- Detention Basins in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-37
SCENARIO 3B - 2B PARTICLE TRACK SIMULATION WITH CACTUS BASINS 1 ,2, & 3 RECHARGE

ERM

PREPARED BY:
RK (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_73.mxd

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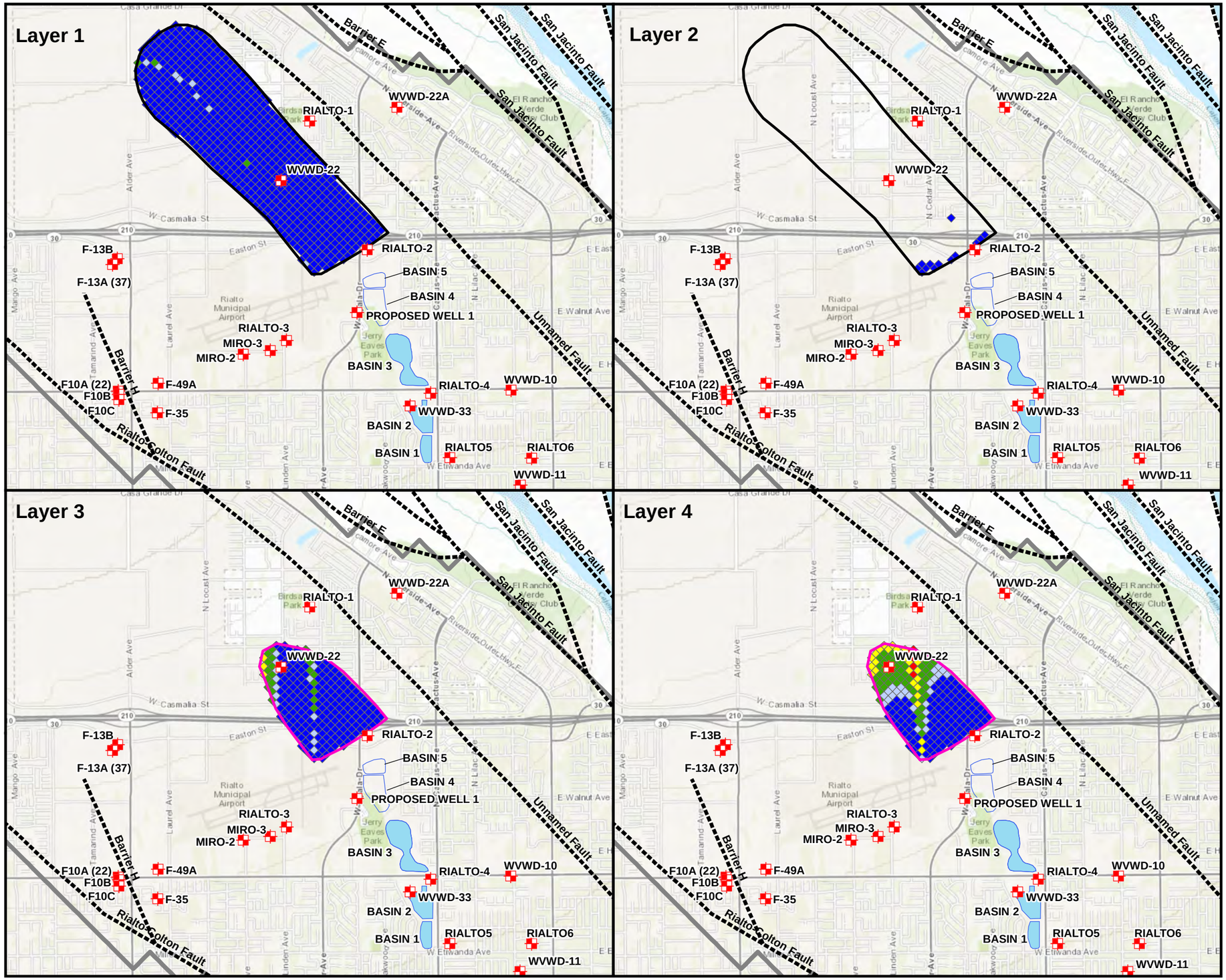


## Legend

- Production Well
- Faults
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-38

SCENARIO 3B - 2B FREQUENCY OF CAPTURE WITH CACTUS BASIN 1, 2, & 3 RECHARGE

ERM

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JOB NO. 0179962.03.A
FILE: 0179962_74.mxd

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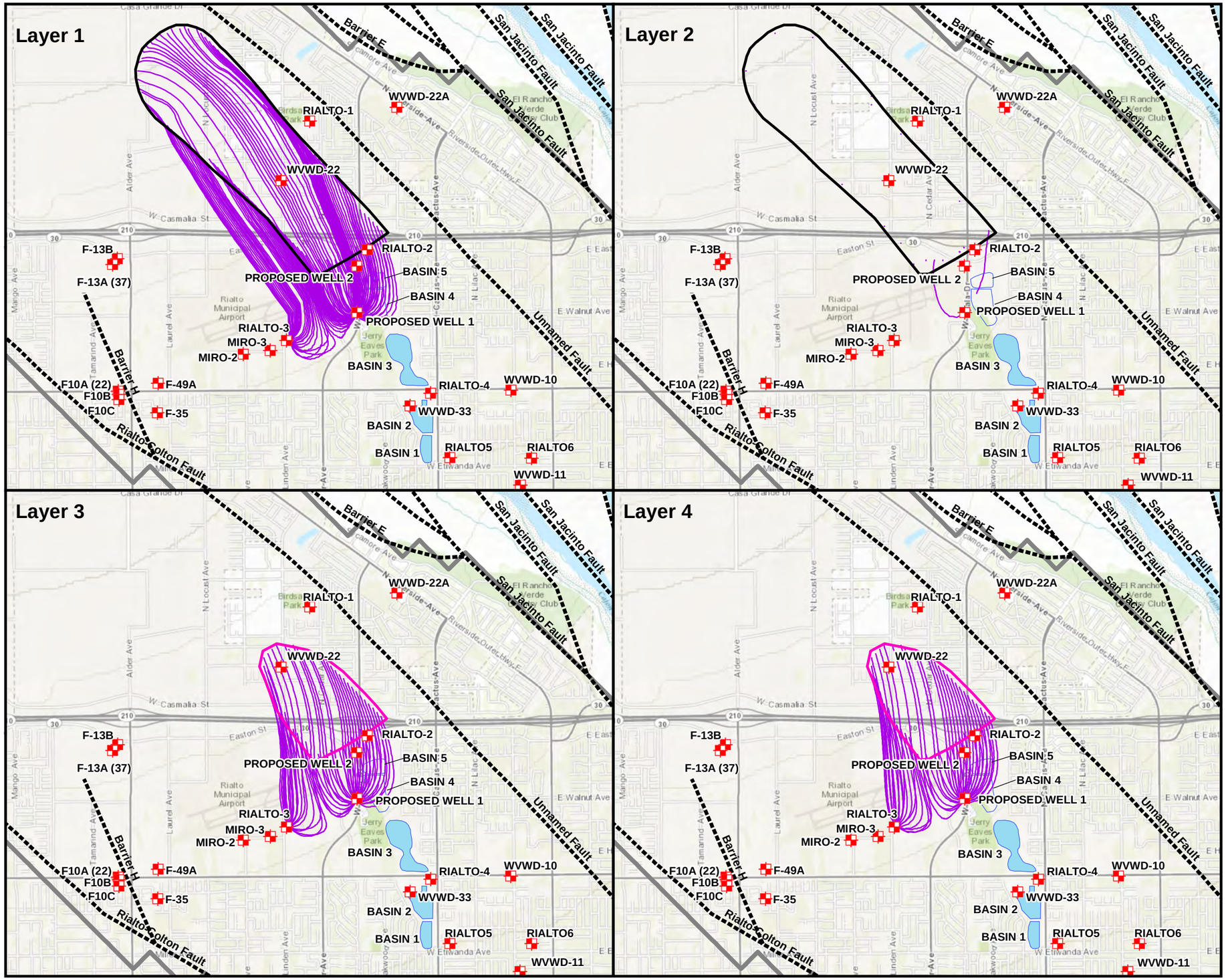


## Legend

- Production Well
- Faults
- Model Particle Tracks
- Regional Aquifer Target Capture Zone
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-39
SCENARIO 3B - 2D-1 PARTICLE TRACK SIMULATION WITH CACTUS BASIN 1 ,2, & 3 RECHARGE

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_75.mxd

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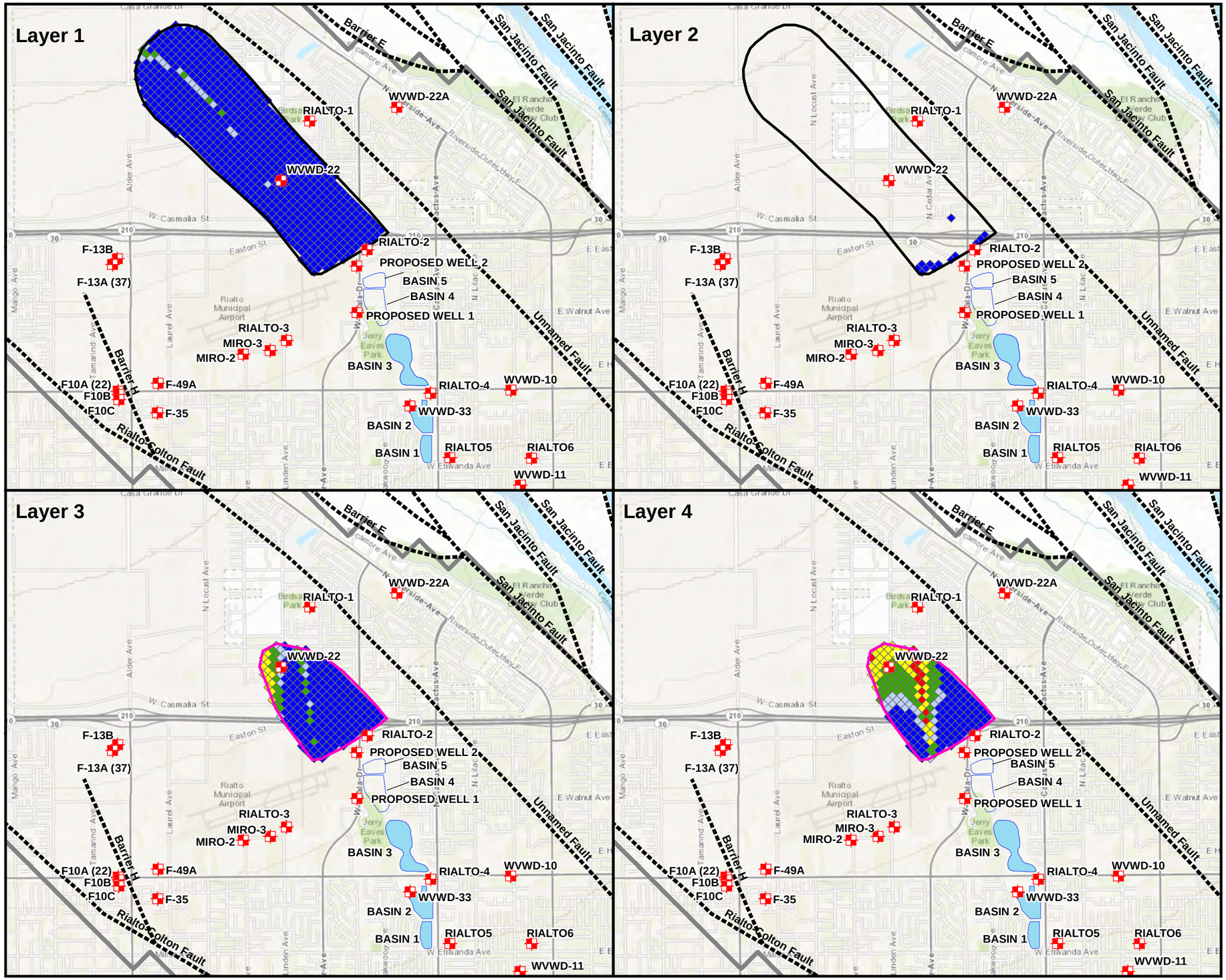


## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-40
SCENARIO 3B - 2D-1
FREQUENCY OF CAPTURE
WITH CACTUS BASINS 1, 2, & 3
RECHARGE

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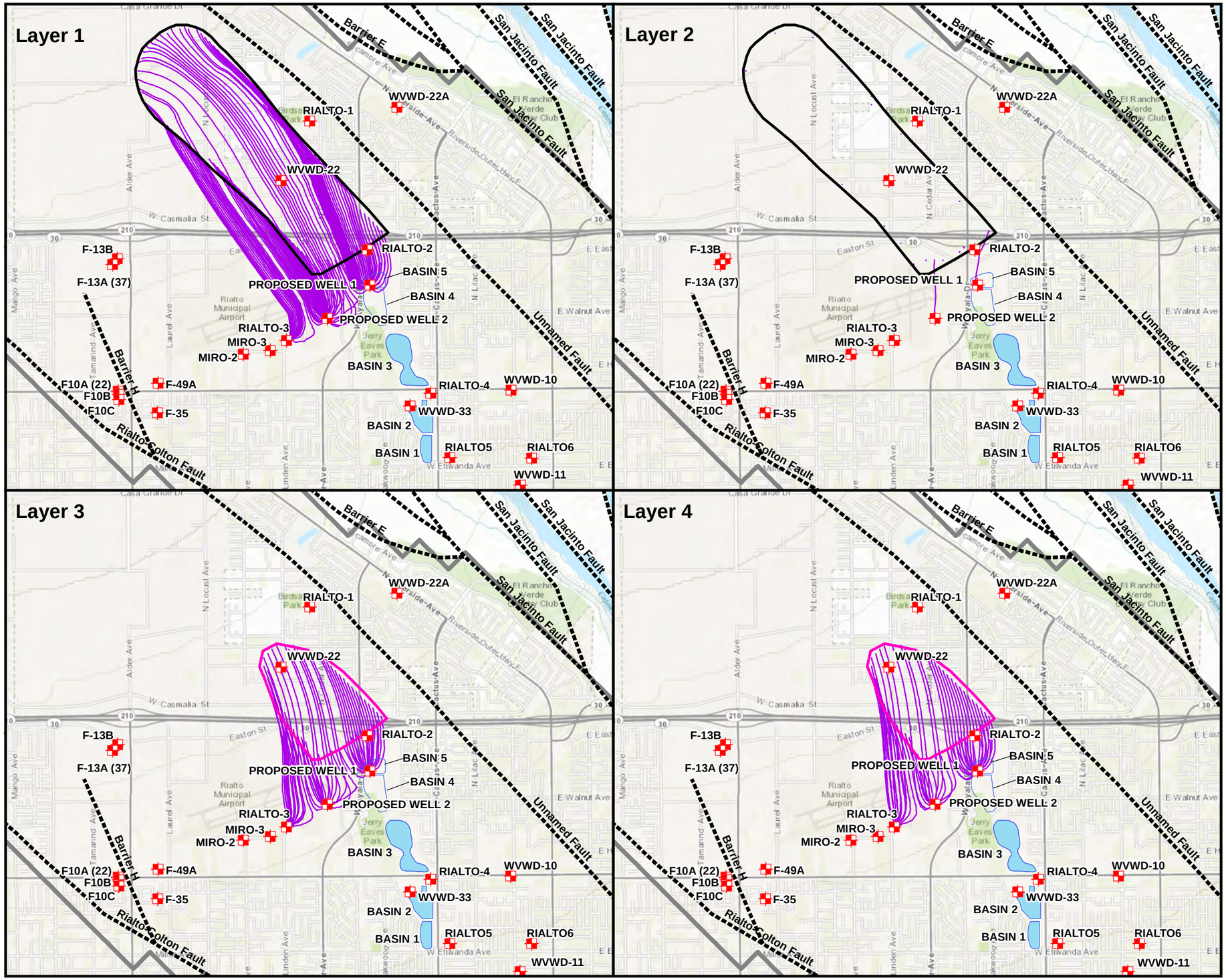


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-41
SCENARIO 3B - 2D-2
PARTICLE TRACK SIMULATION
WITH CACTUS BASINS
1, 2, & 3 RECHARGE

ERM

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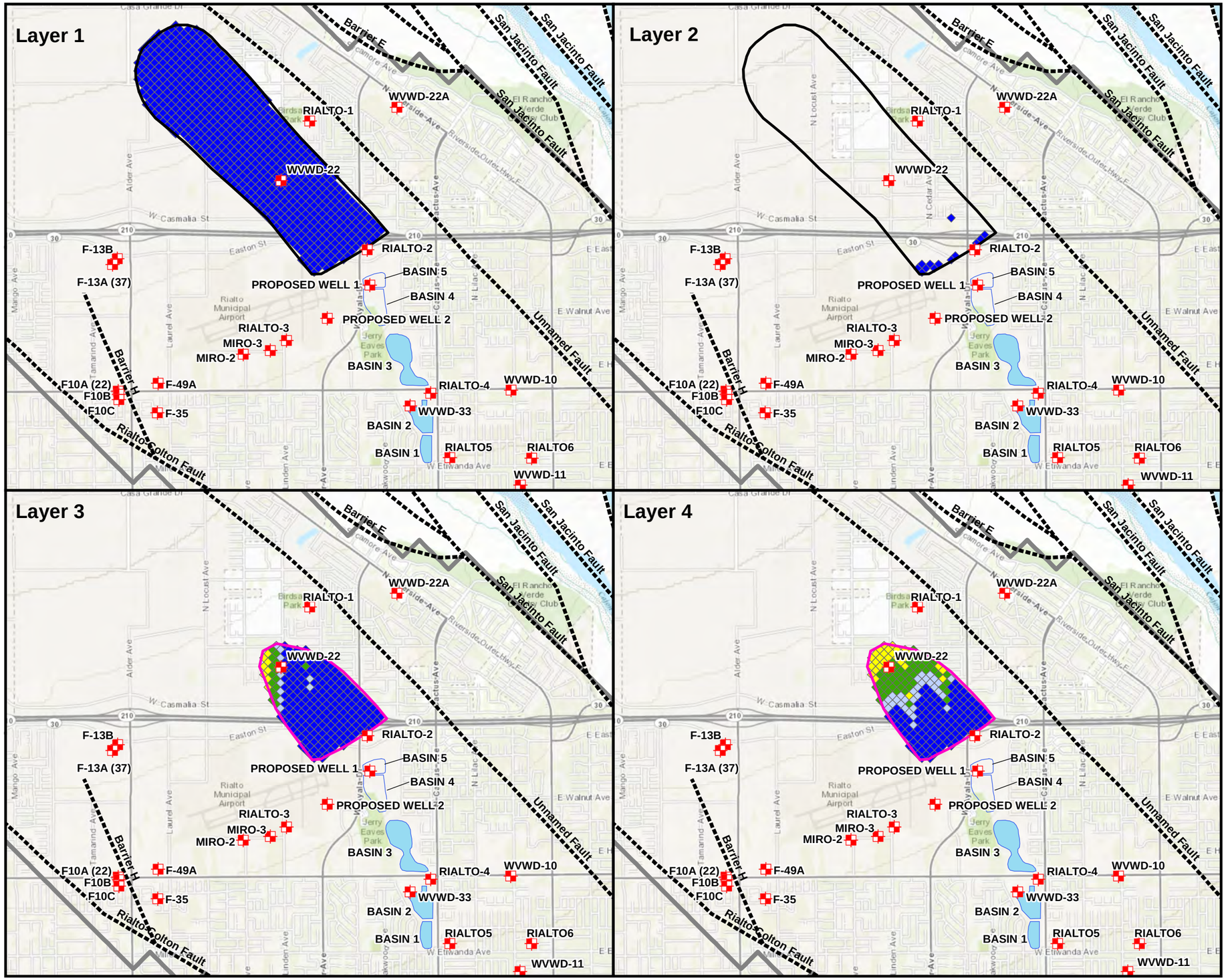


| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-42

SCENARIO 3B - 2D-2 FREQUENCY OF CAPTURE WITH CACTUS BASINS 1, 2, & 3 RECHARGE

ERM

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JOB NO. 0179962.03.A
FILE: 0179962_138.mxd

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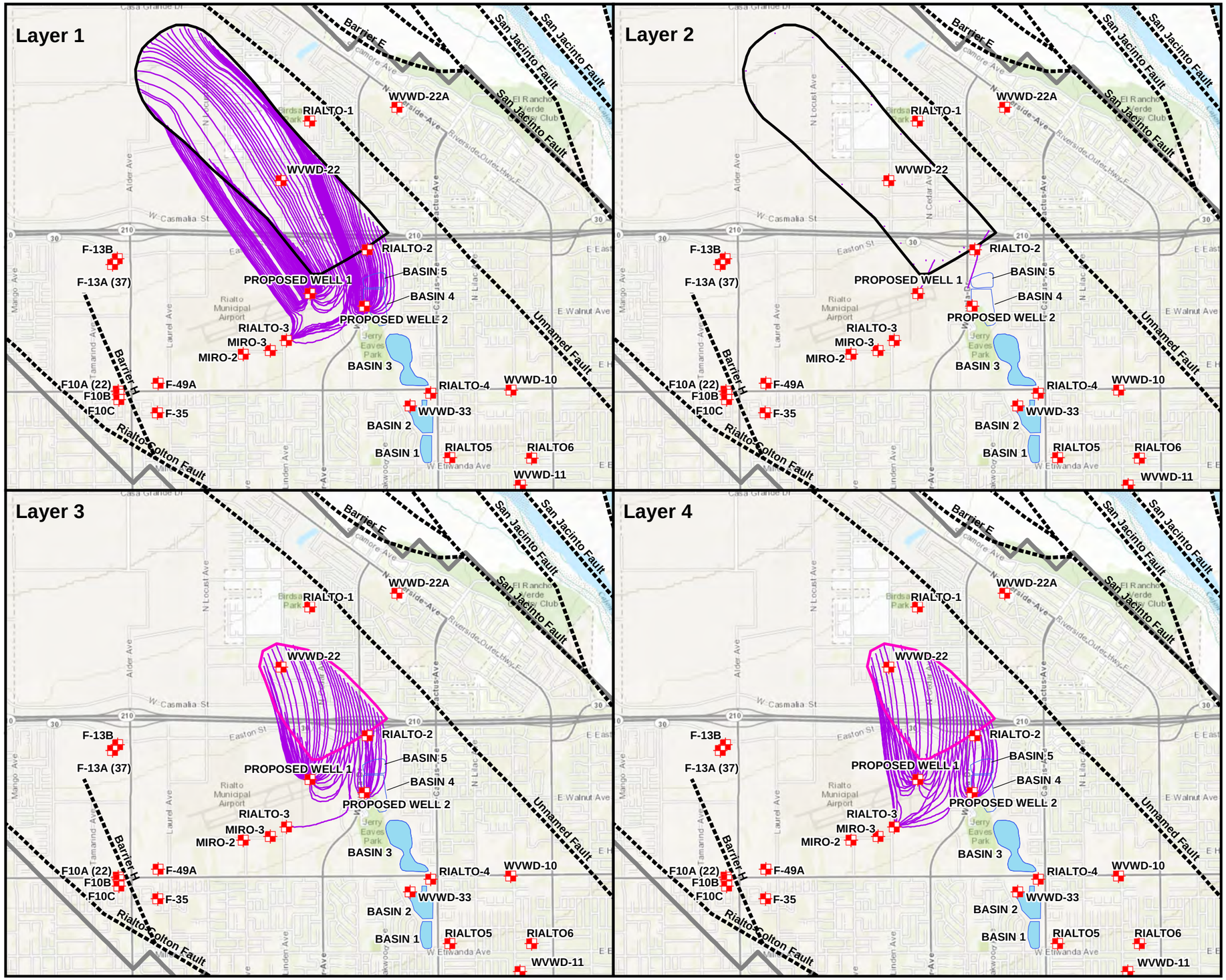


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-43
SCENARIO 3B - 2D-3
PARTICLE TRACK SIMULATION
WITH CACTUS BASINS
1, 2, & 3 RECHARGE

ERM

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JOB NO. 0179962.03.A
FILE: 0179962_139.mxd

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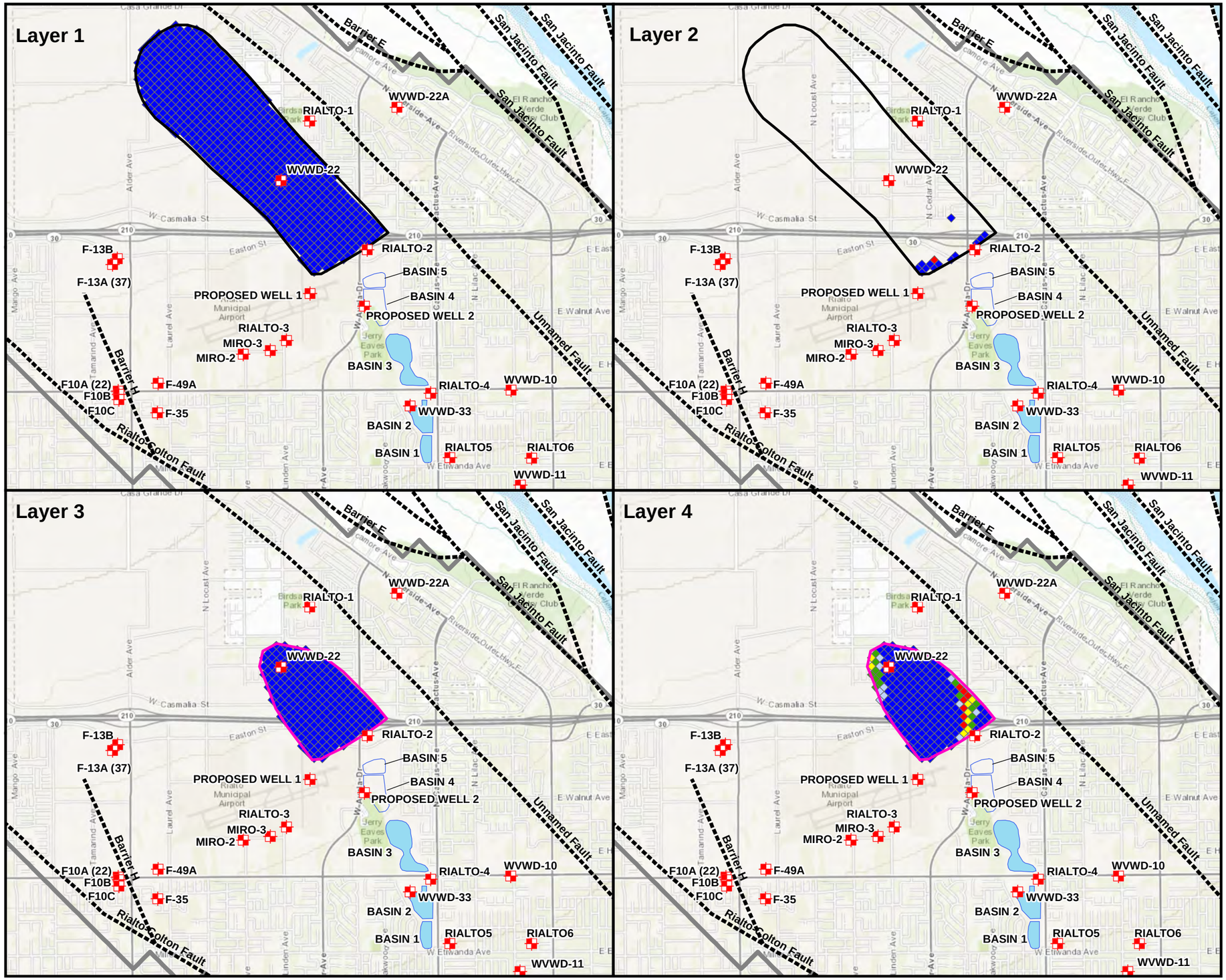


## Legend

- Production Well
- Faults
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Detention Basins in Simulation
- Detention Basins not in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-44

SCENARIO 3B - 2D-3 FREQUENCY OF CAPTURE WITH CACTUS BASINS 1, 2, & 3 RECHARGE

ERM

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JOB NO. 0179962.03.A
FILE: 0179962_140.mxd

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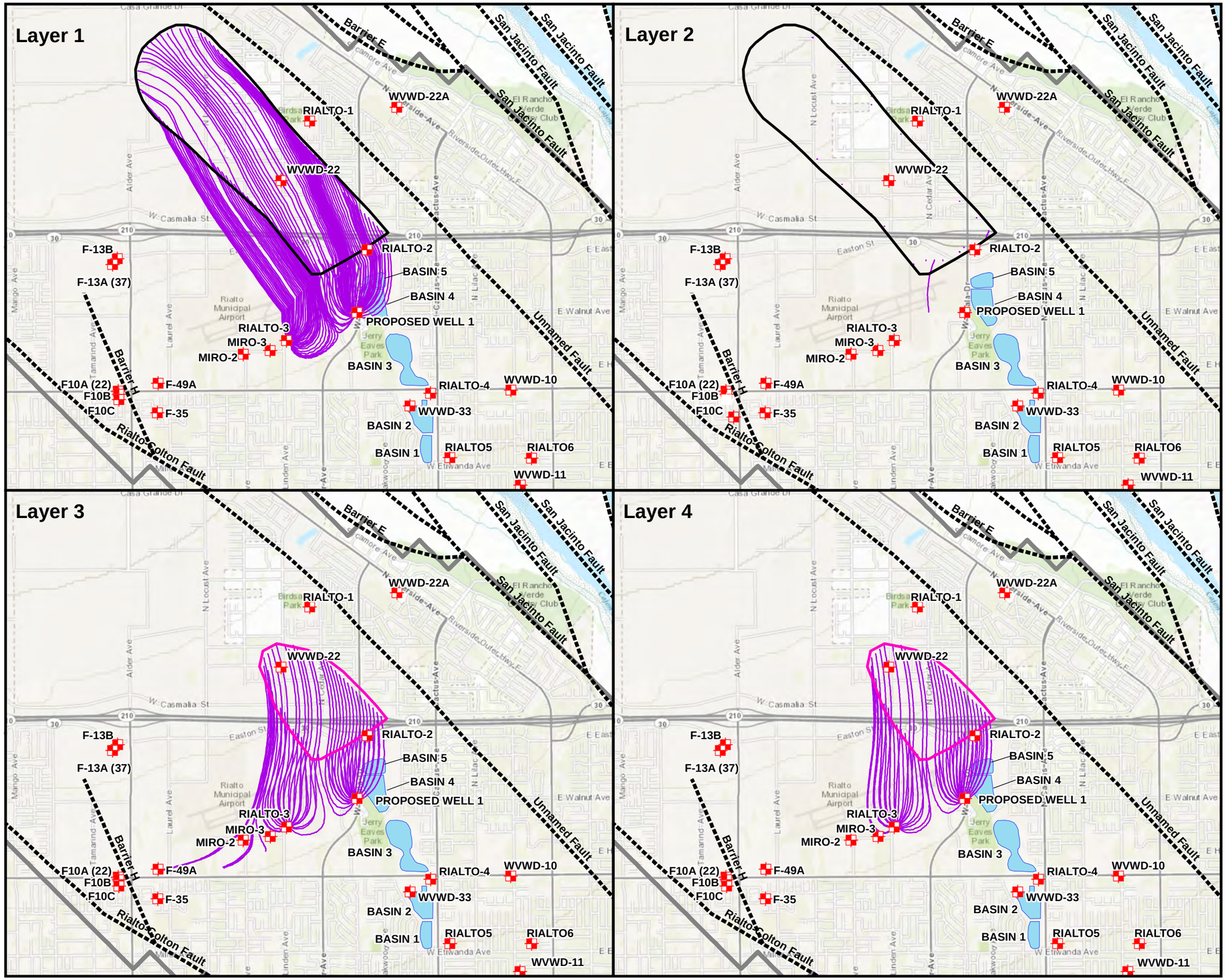


## Legend

- Production Well
- Model Particle Tracks
- Detention Basins in Simulation
- Regional Aquifer Target Capture Zone
- Intermediate Aquifer Target Capture Zone
- Faults
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-45
SCENARIO 3C - 2B
PARTICLE TRACK SIMULATION
WITH CACTUS BASINS
1 ,2, 3, 4, & 5 RECHARGE

ERM

PREPARED BY:
RK (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_141.mxd

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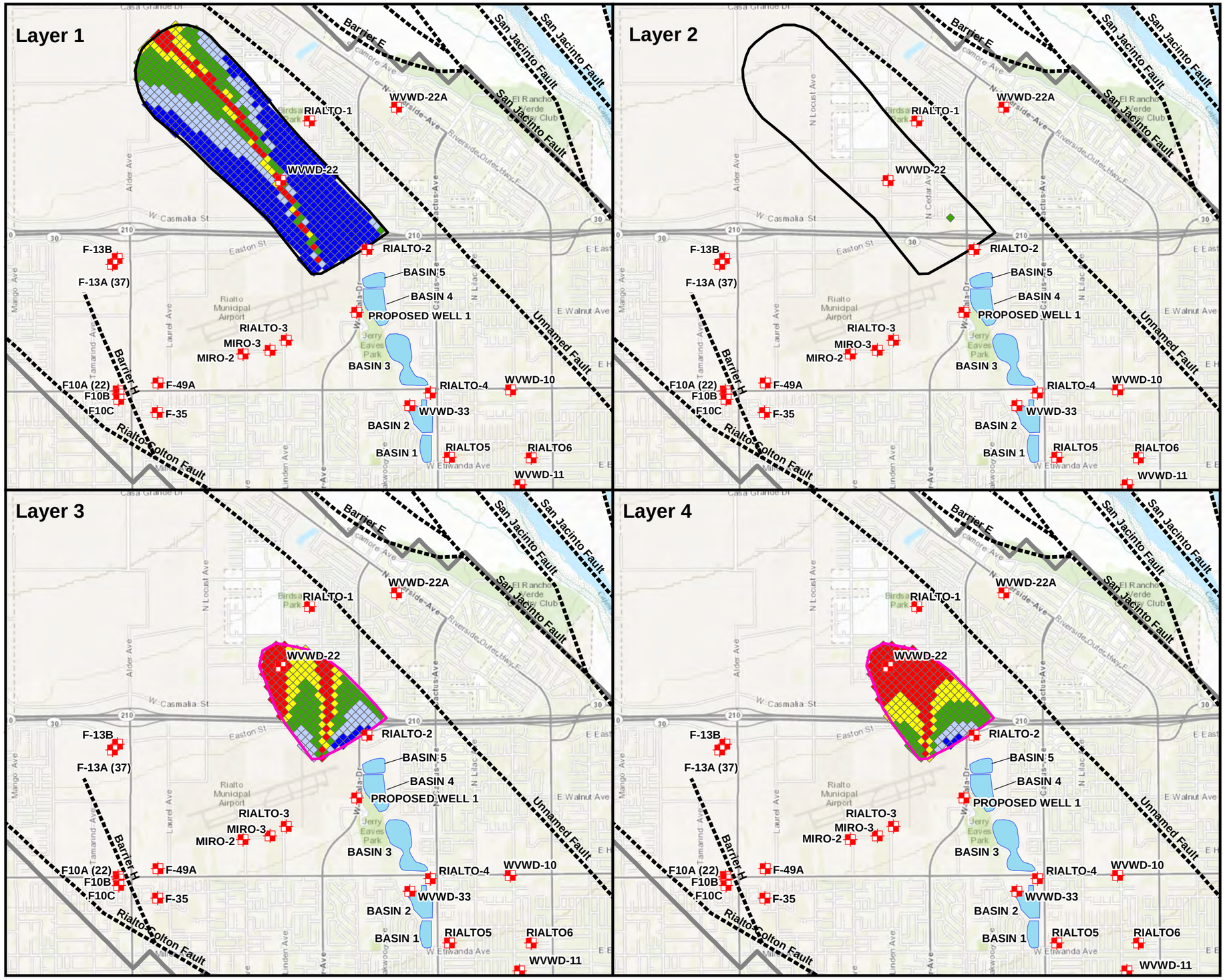


## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Detention Basins in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-46
SCENARIO 3C - 2B
FREQUENCY OF CAPTURE
WITH CACTUS BASINS
1, 2, 3, 4, & 5 RECHARGE

ERM

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CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_78.mxd

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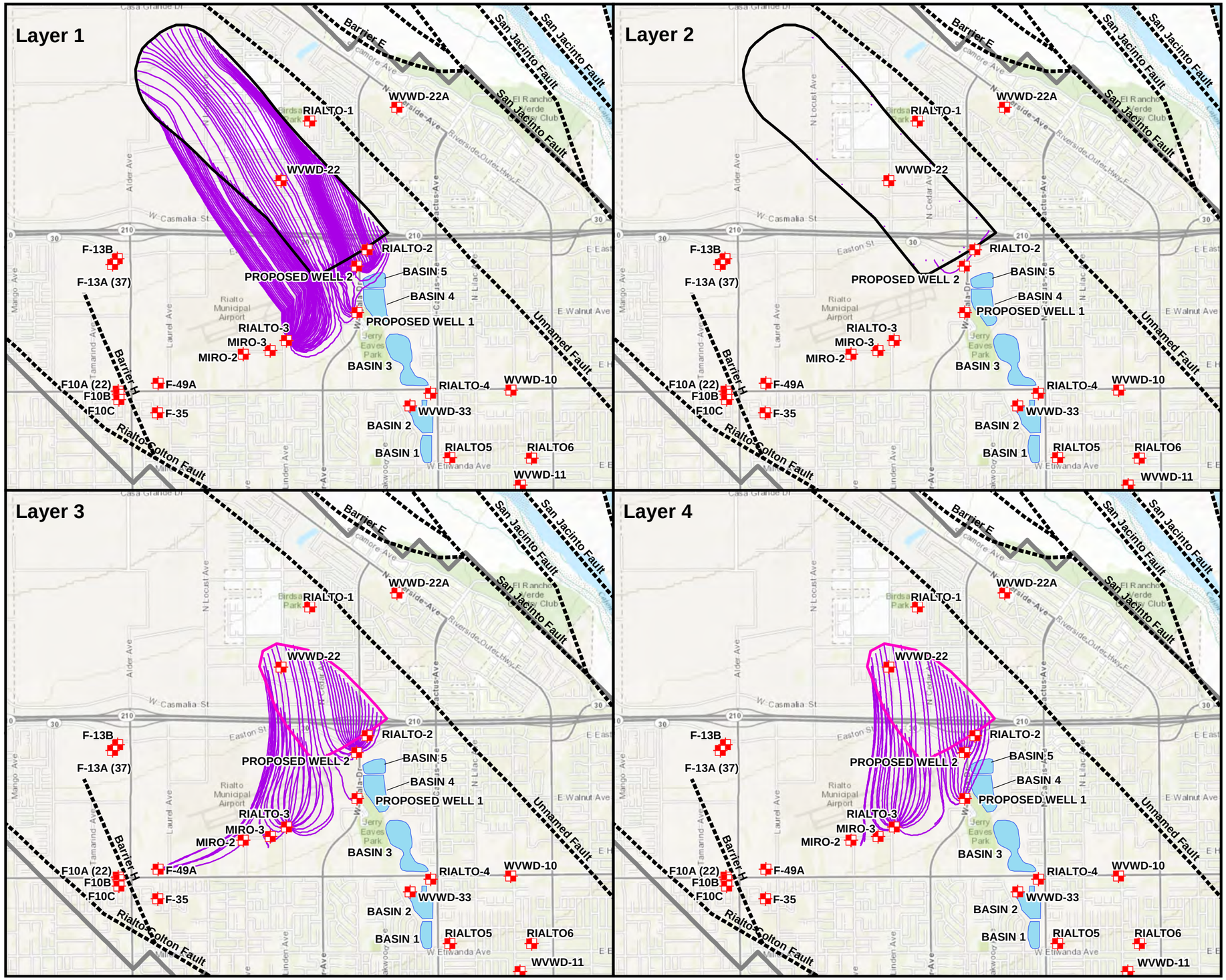


## Legend

- Production Well
- Model Particle Tracks
- Detention Basins in Simulation
- Regional Aquifer Target Capture Zone
- Intermediate Aquifer Target Capture Zone
- Faults
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-47
SCENARIO 3C - 2D-1
PARTICLE TRACK SIMULATION
WITH CACTUS BASINS
1, 2, 3, 4 & 5 RECHARGE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_79.mxd

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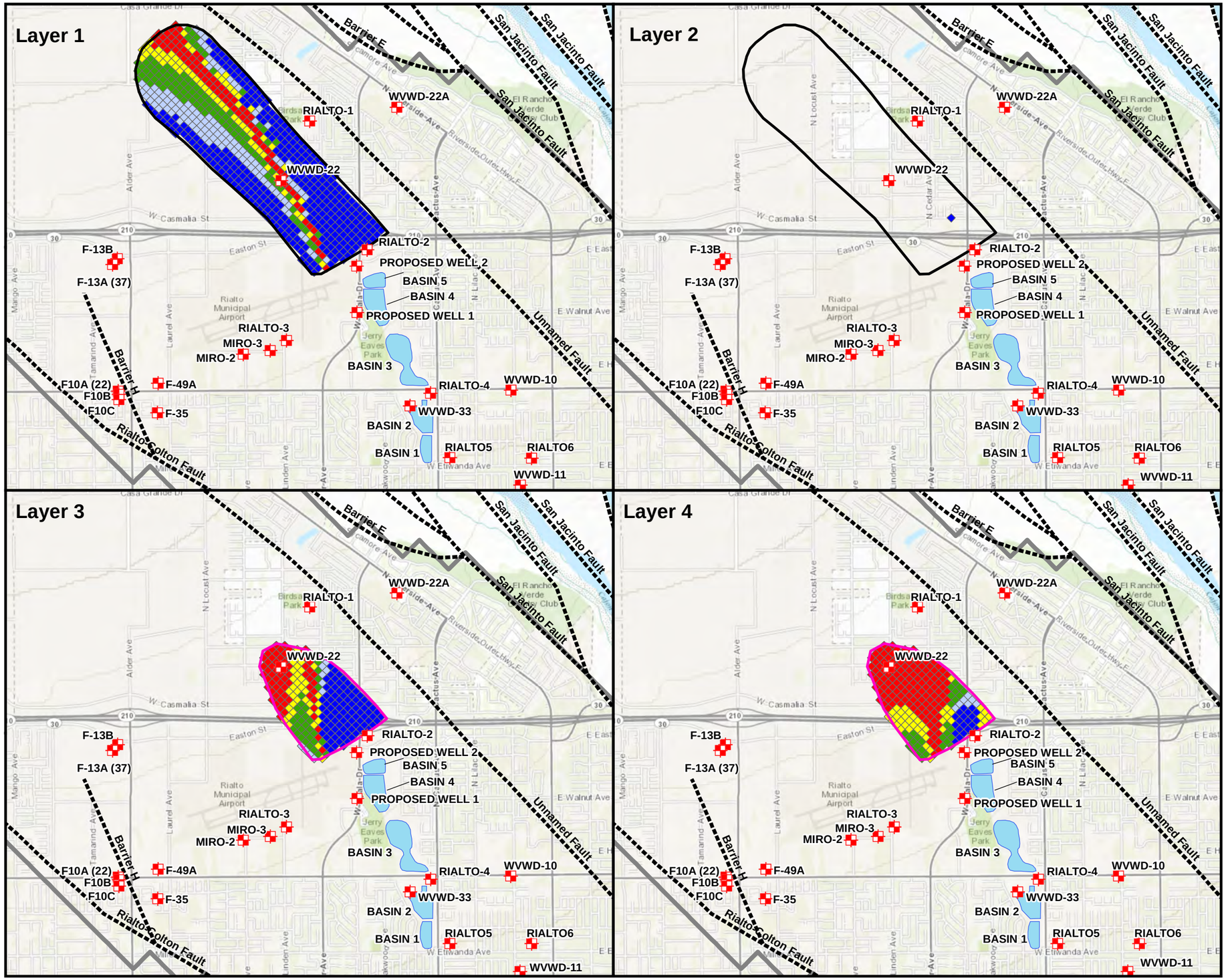


| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-48
SCENARIO 3C - 2D-1
FREQUENCY OF CAPTURE
WITH CACTUS BASINS
1, 2, 3, 4, & 5 RECHARGE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_80.mxd

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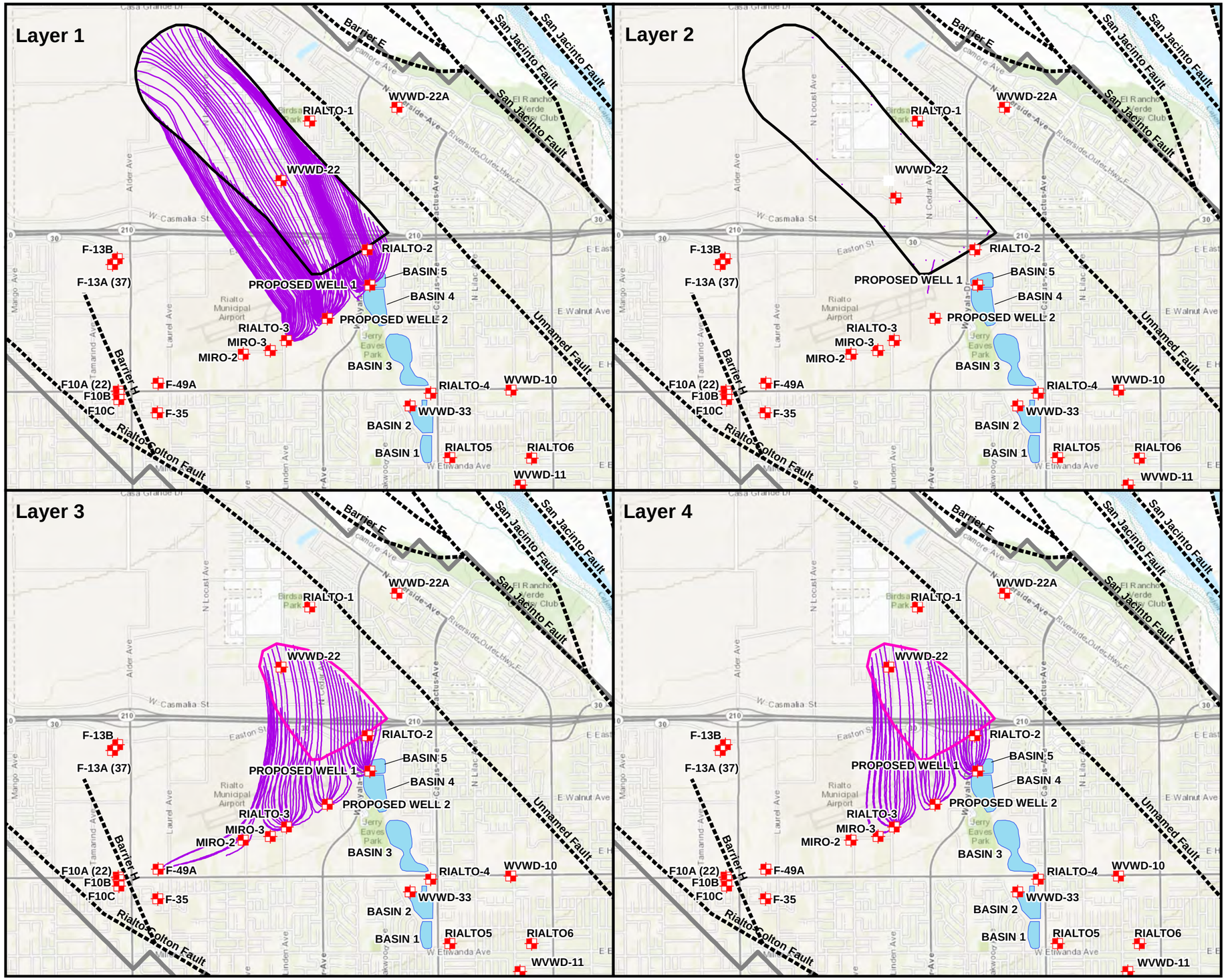


## Legend

- Production Well
- Model Particle Tracks
- Detention Basins in Simulation
- Regional Aquifer Target Capture Zone
- Intermediate Aquifer Target Capture Zone
- Faults
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-49
SCENARIO 3C - 2D-2
PARTICLE TRACK SIMULATION
WITH CACTUS BASINS
1, 2, 3, 4, & 5 RECHARGE

ERM

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CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_136.mxd

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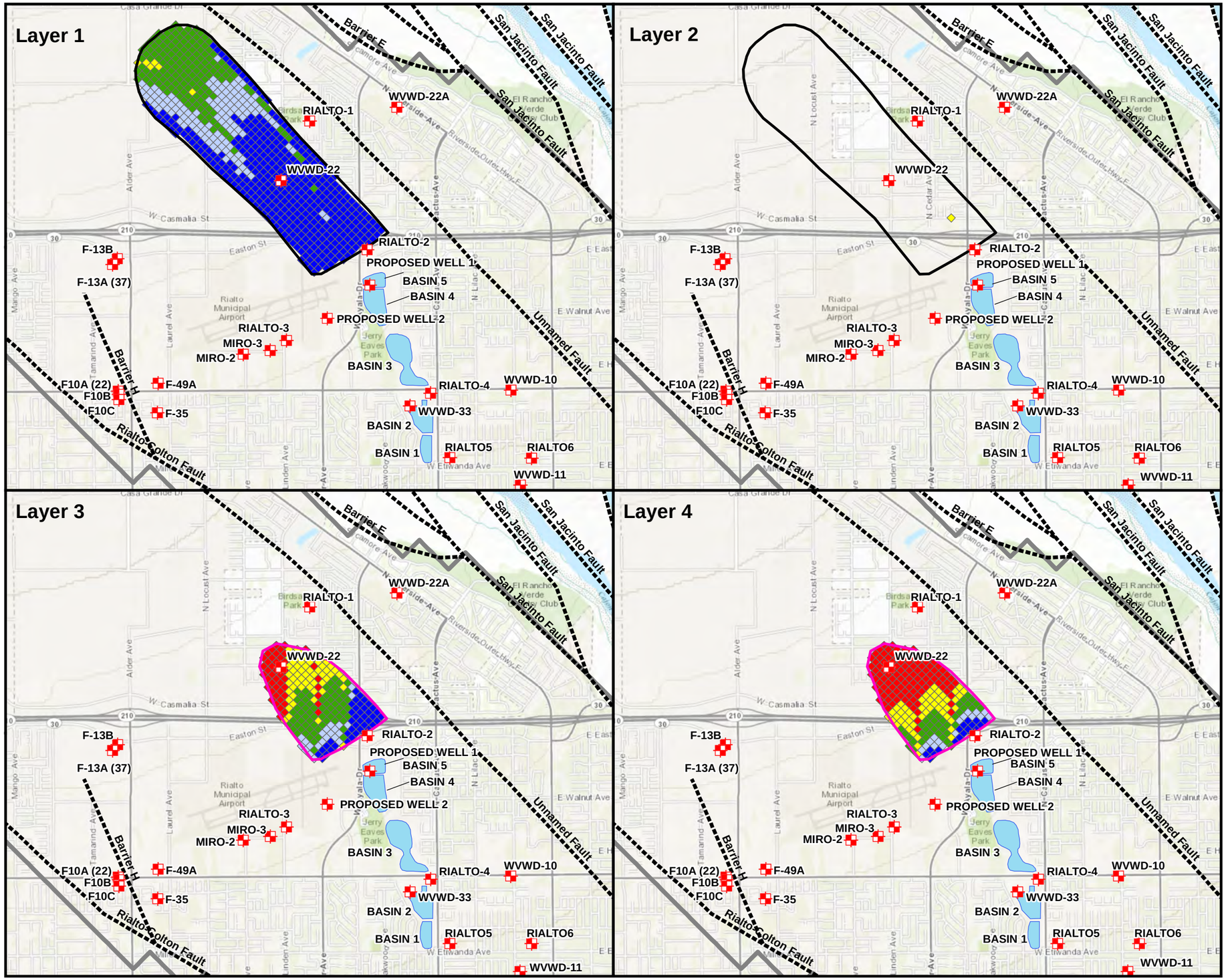


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Detention Basins in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,326 | 5,368 | 2,266 - 3733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-50
SCENARIO 3C - 2D-2
FREQUENCY OF CAPTURE
WITH CACTUS BASINS
1, 2, 3, 4, & 5 RECHARGE

ERM

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FILE: 0179962_142.mxd

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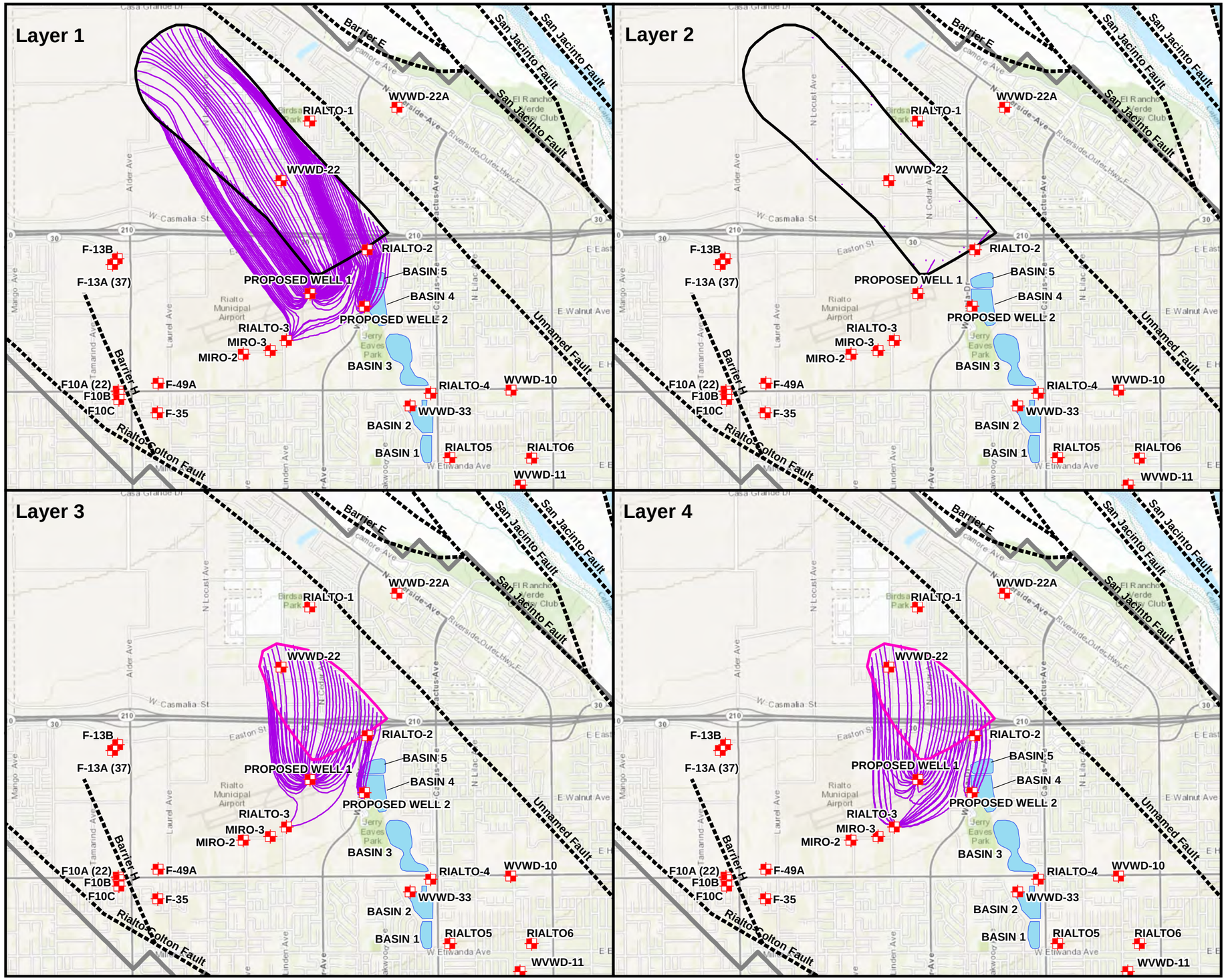


## Legend

- Production Well
- Model Particle Tracks
- Detention Basins in Simulation
- Regional Aquifer Target Capture Zone
- Intermediate Aquifer Target Capture Zone
- Faults
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-51
SCENARIO 3C - 2D-3
PARTICLE TRACK SIMULATION
WITH CACTUS BASINS
1, 2, 3, 4, & 5 RECHARGE

ERM

PREPARED BY:
CTALBOT (ERM)

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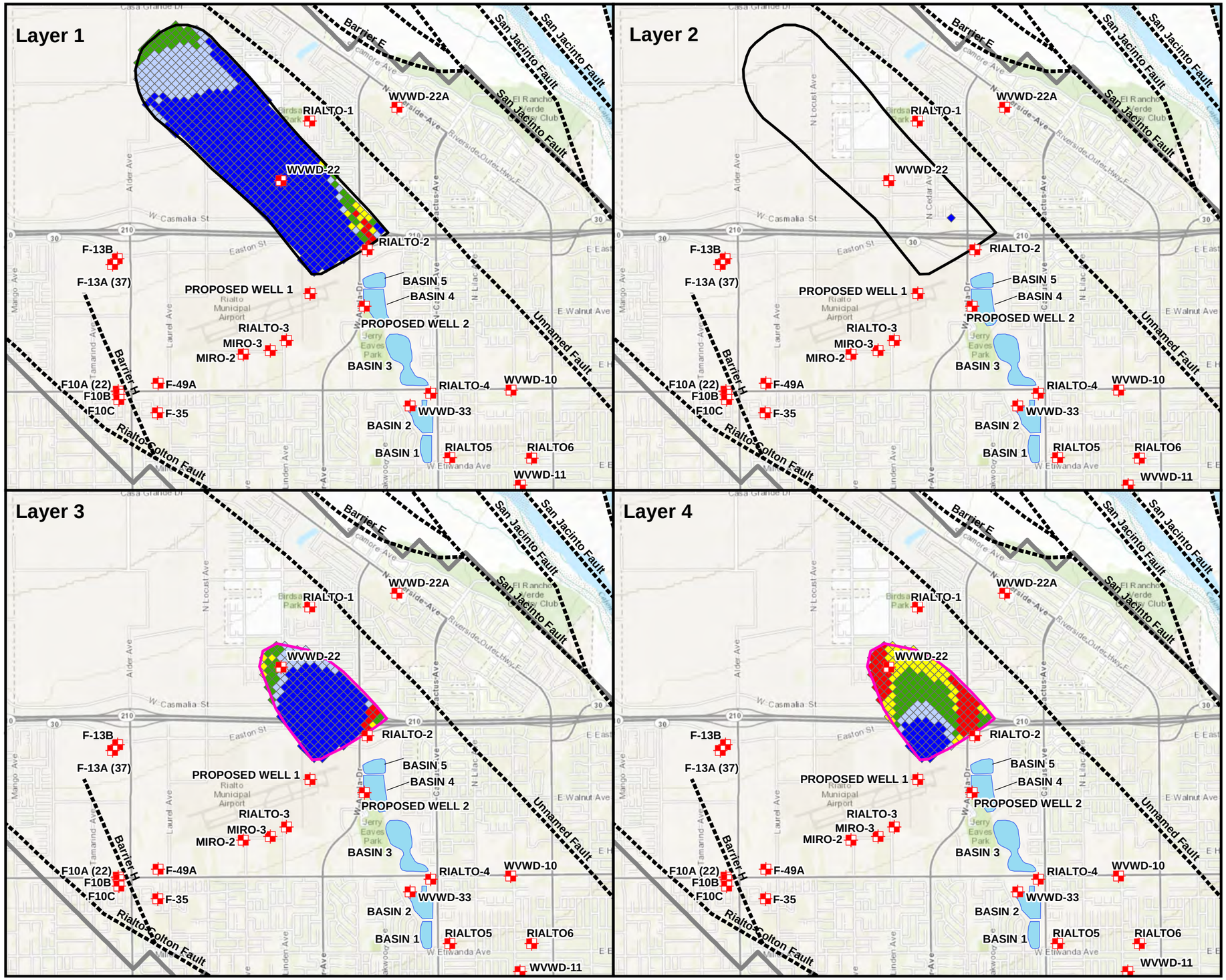


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Detention Basins in Simulation
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,239 | 2,000 | 844 - 1,391 |
| Proposed Well 2 | 929 | 1,500 | 633 - 1,043 |
| Total Flow Rate | 3,325 | 5,368 | 2,266 - 3,733 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,500
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-52
SCENARIO 3C - 2D-3
FREQUENCY OF CAPTURE
WITH CACTUS BASINS
1, 2, 3, 4, & 5 RECHARGE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_144.mxd

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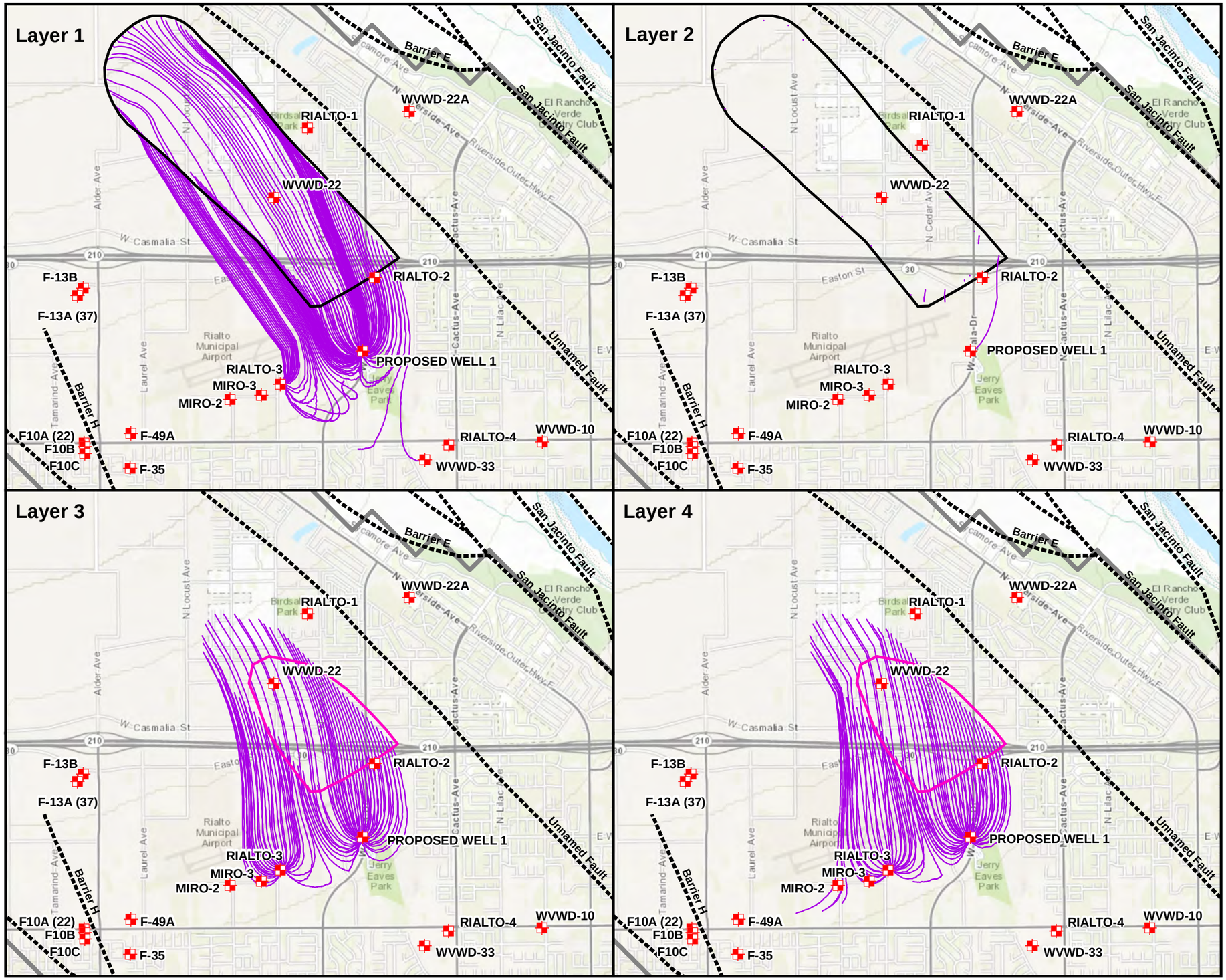


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-53

SENSITIVITY ANALYSIS TO CAPTURE ZONE - SCENARIO 2B PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_81.mxd

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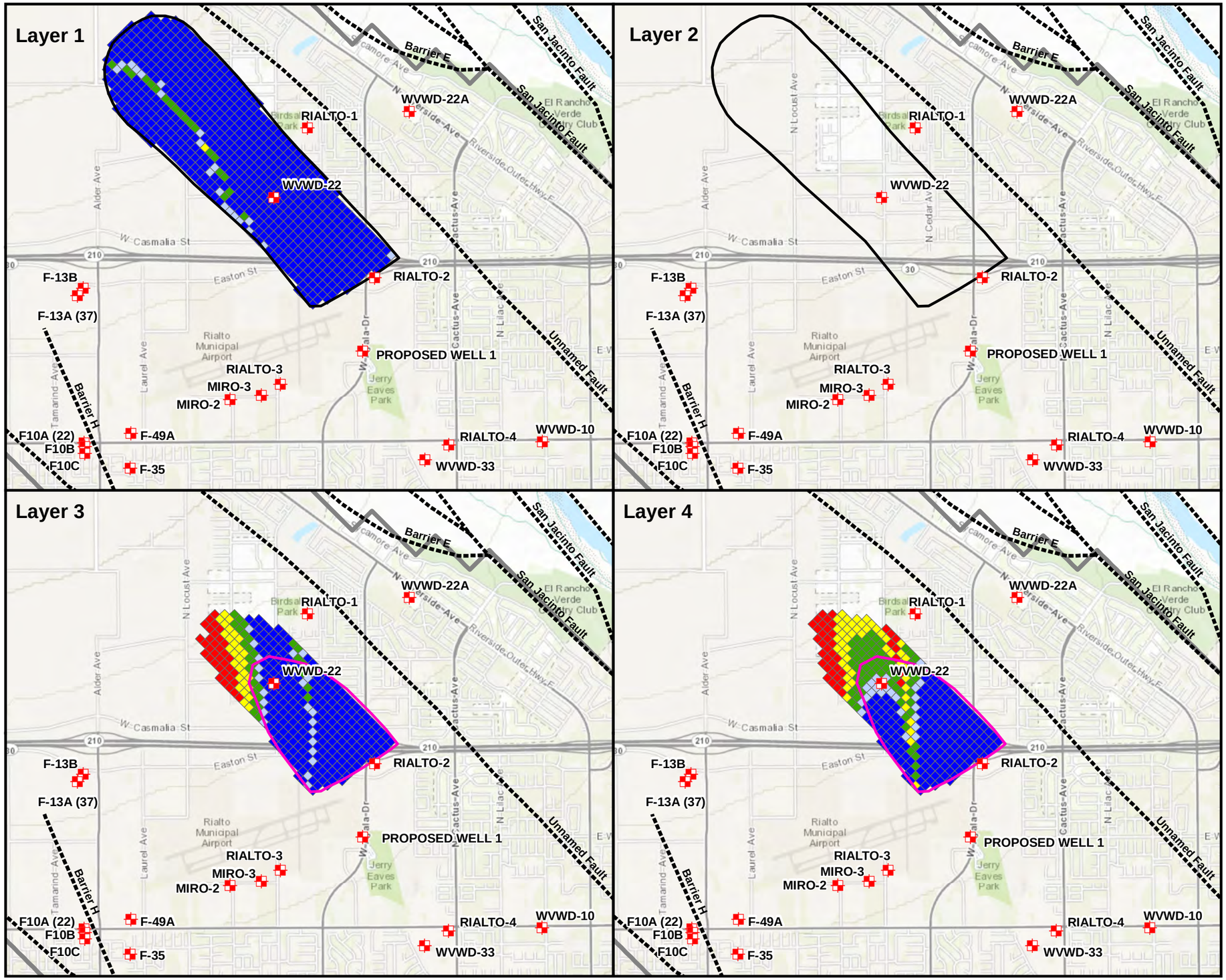


## Legend

- Production Well
- Faults
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-54

SENSITIVITY ANALYSIS TO CAPTURE ZONE - SCENARIO 2B FREQUENCY OF CAPTURE

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_82.mxd

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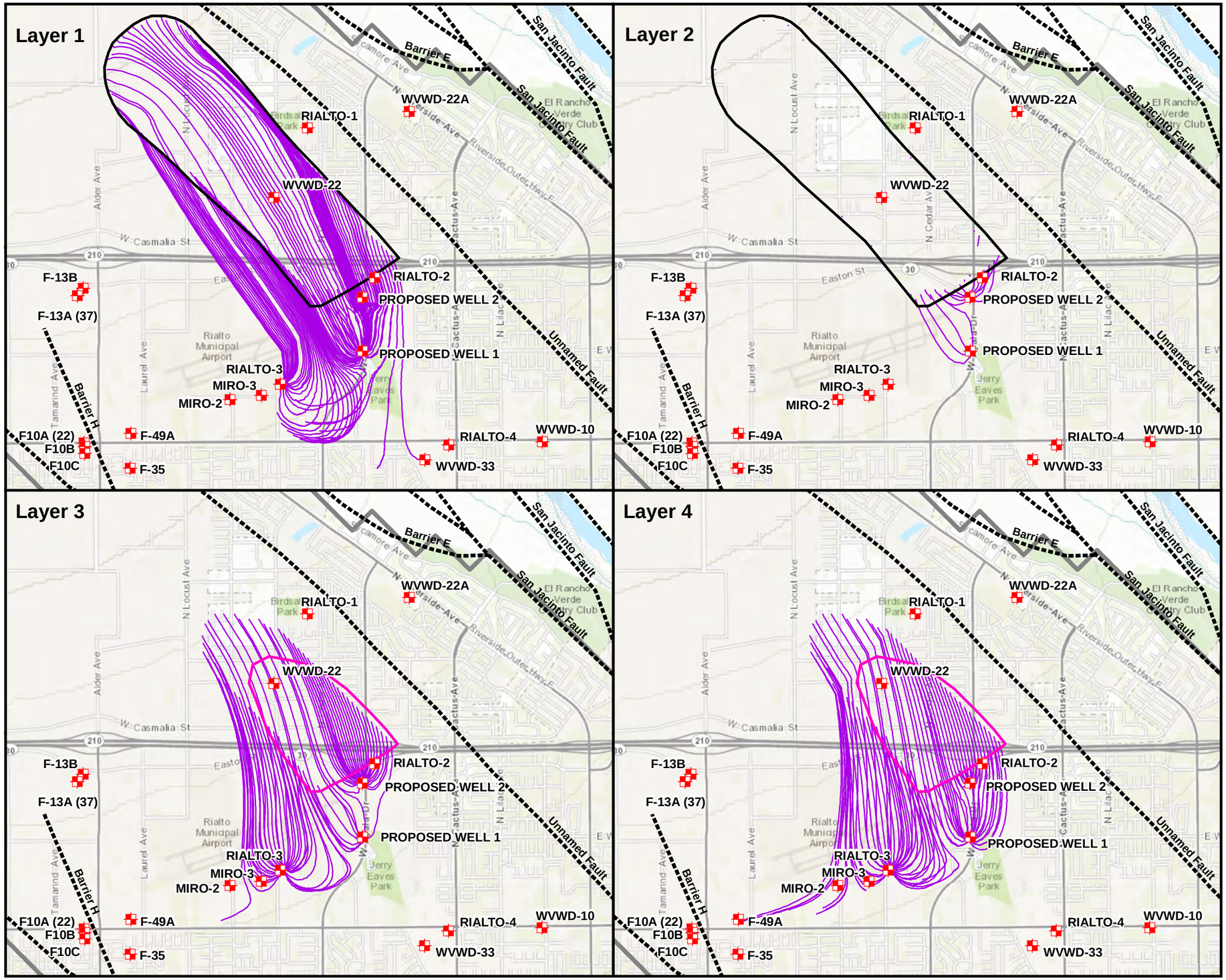


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-55

SENSITIVITY ANALYSIS TO
CAPTURE ZONE - SCENARIO 2D-1
PARTICLE TRACK SIMULATION

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962.03.A<br>FILE: 0179962_146.mxd |
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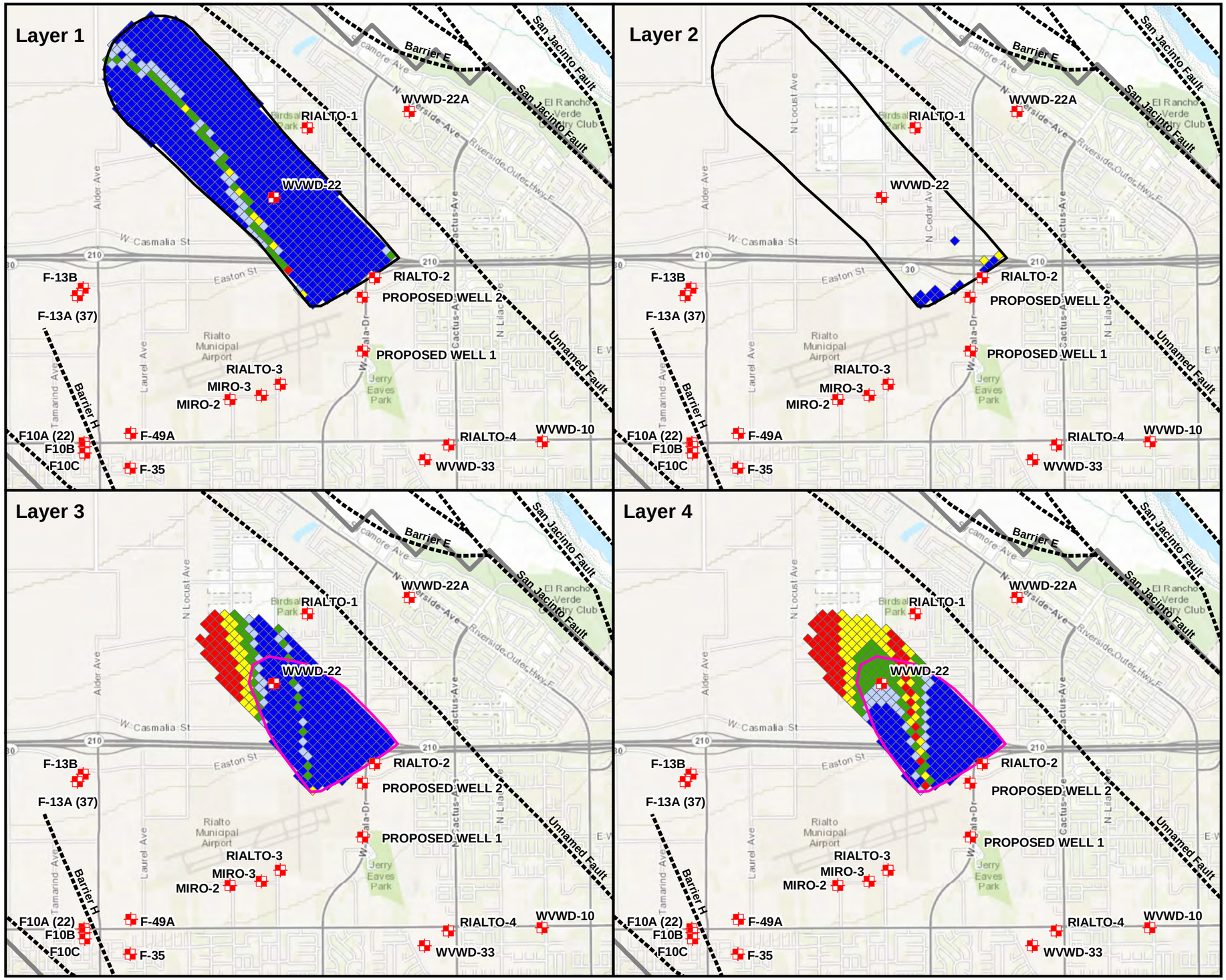


## Legend

- Production Well
- Faults
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-56

SENSITIVITY ANALYSIS TO CAPTURE ZONE - SCENARIO 2D-1 FREQUENCY OF CAPTURE

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_84.mxd

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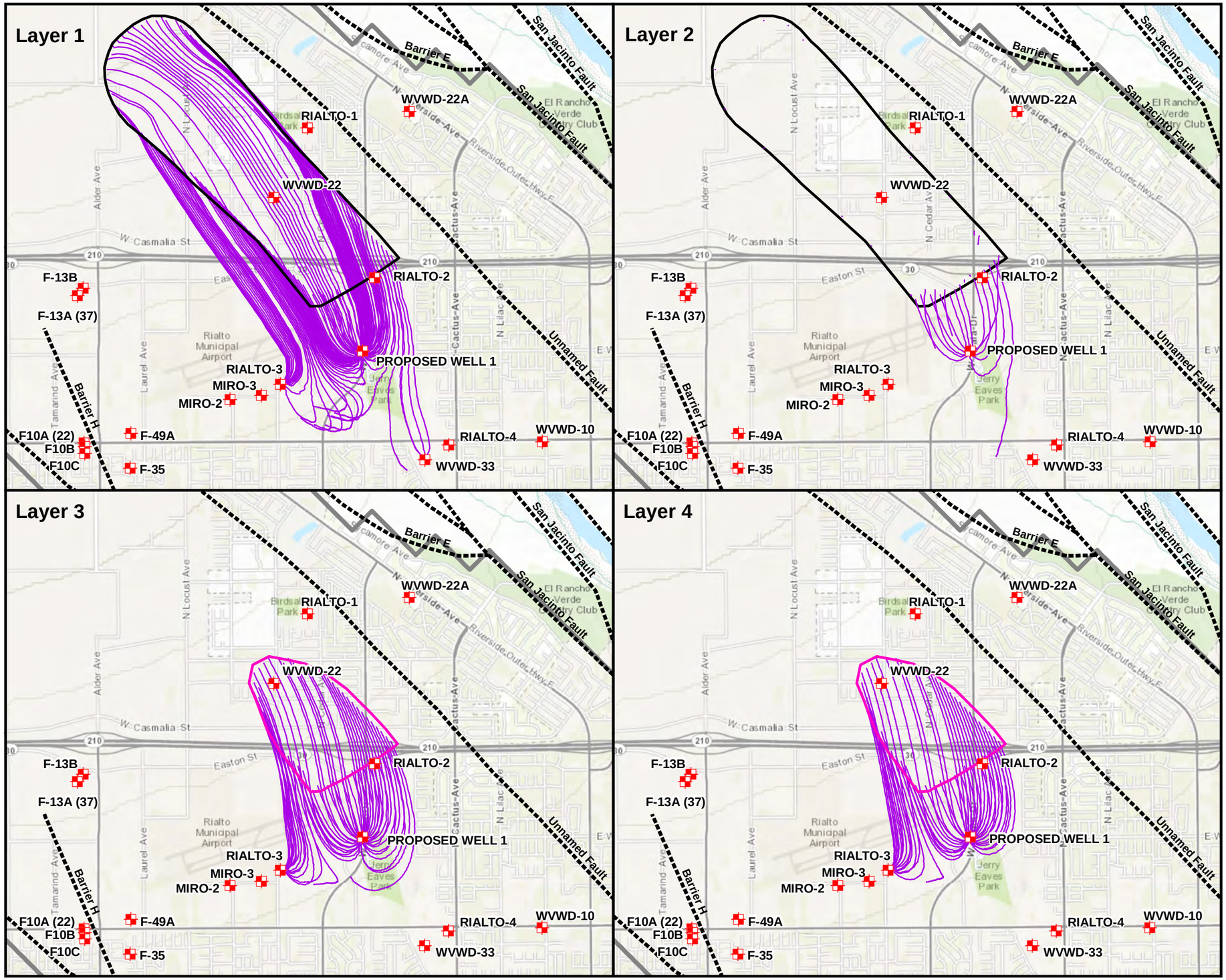


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-57
SENSITIVITY ANALYSIS TO HIGH HORIZONTAL HYDRAULIC CONDUCTIVITY - SCENARIO 2B PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_85.mxd

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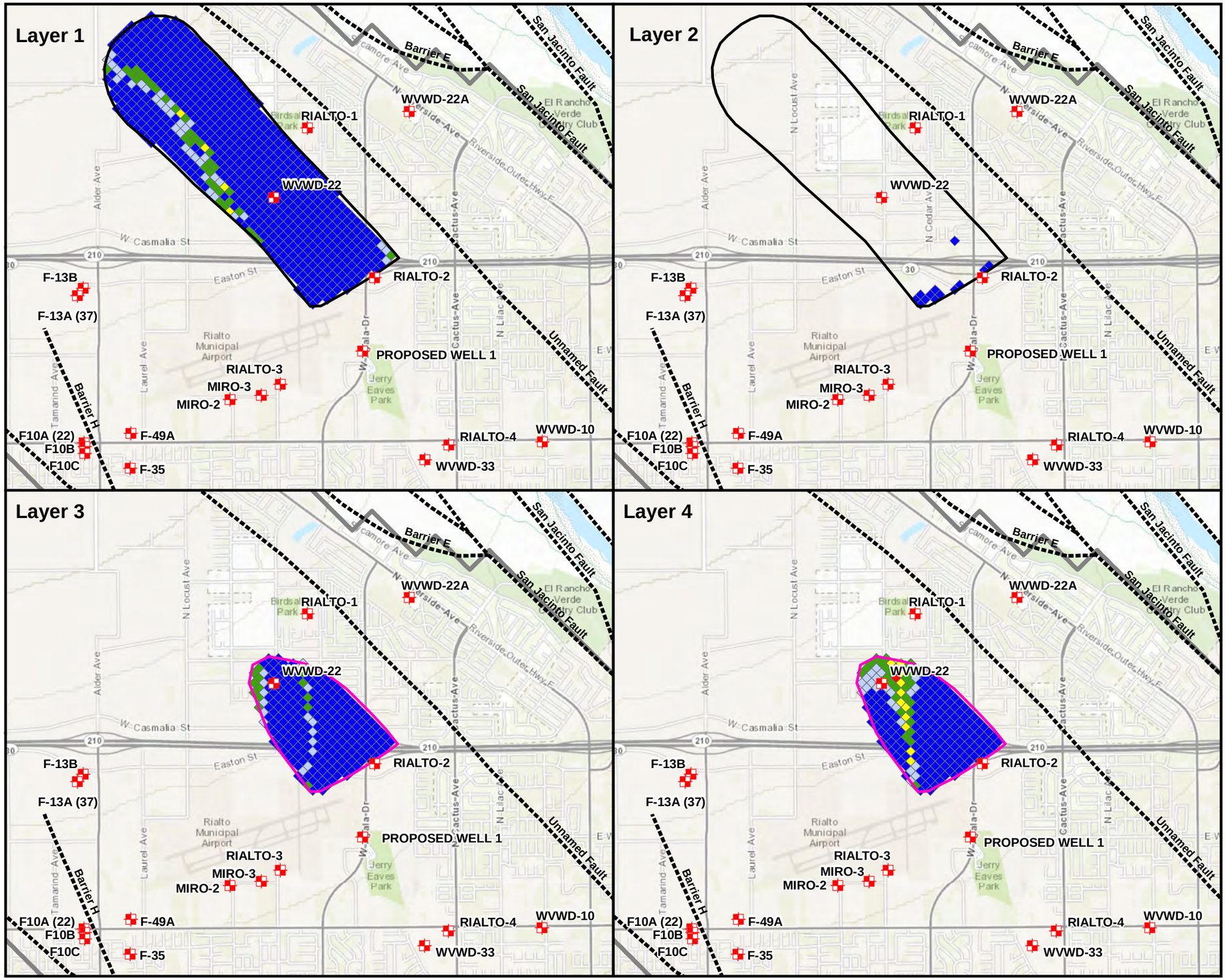


## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-58
SENSITIVITY ANALYSIS TO
HIGH HORIZONTAL HYDRAULIC
CONDUCTIVITY - SCENARIO 2B
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_86.mxd

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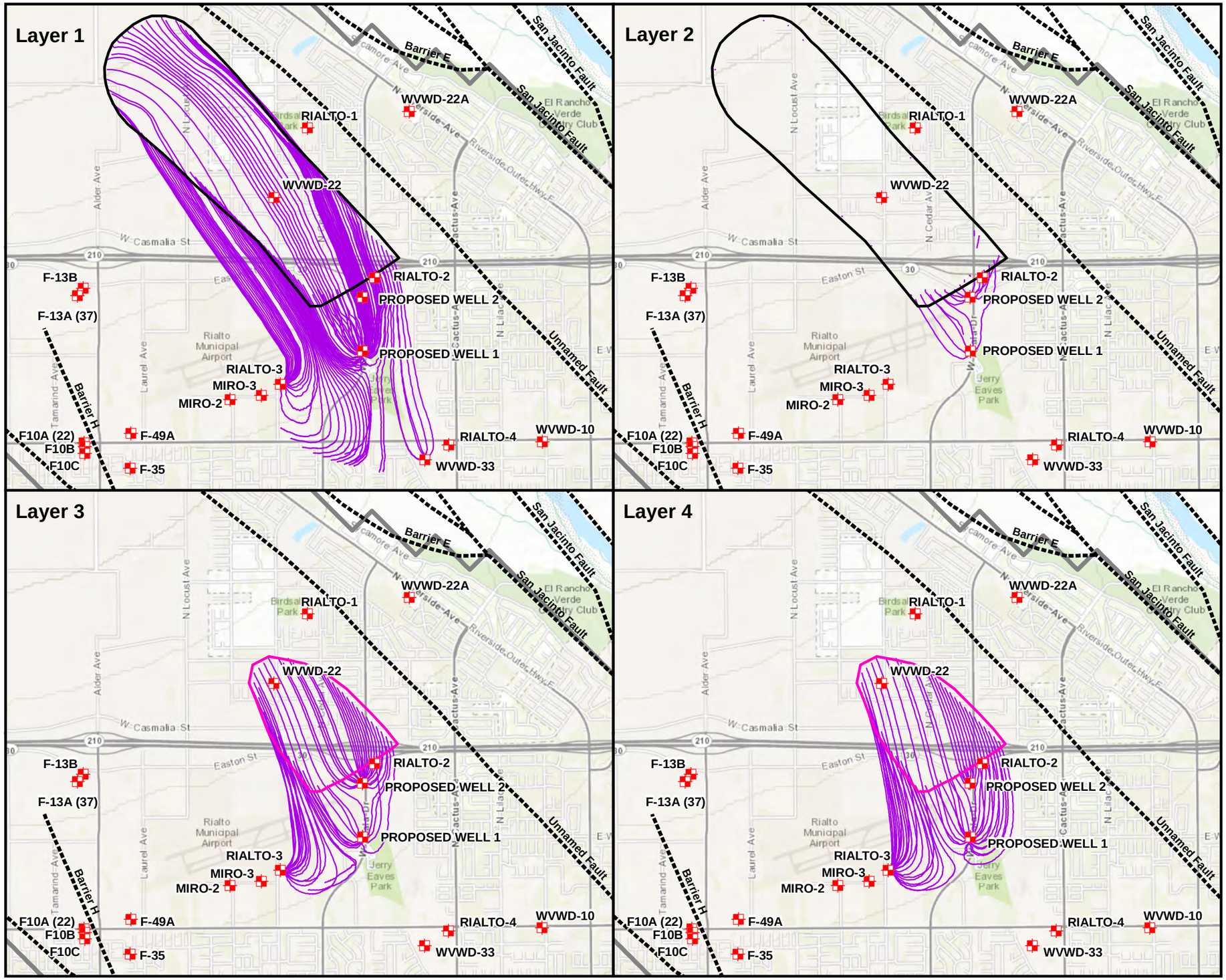


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-59
SENSITIVITY ANALYSIS TO HIGH HORIZONTAL HYDRAULIC CONDUCTIVITY - SCENARIO 2D-1 PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
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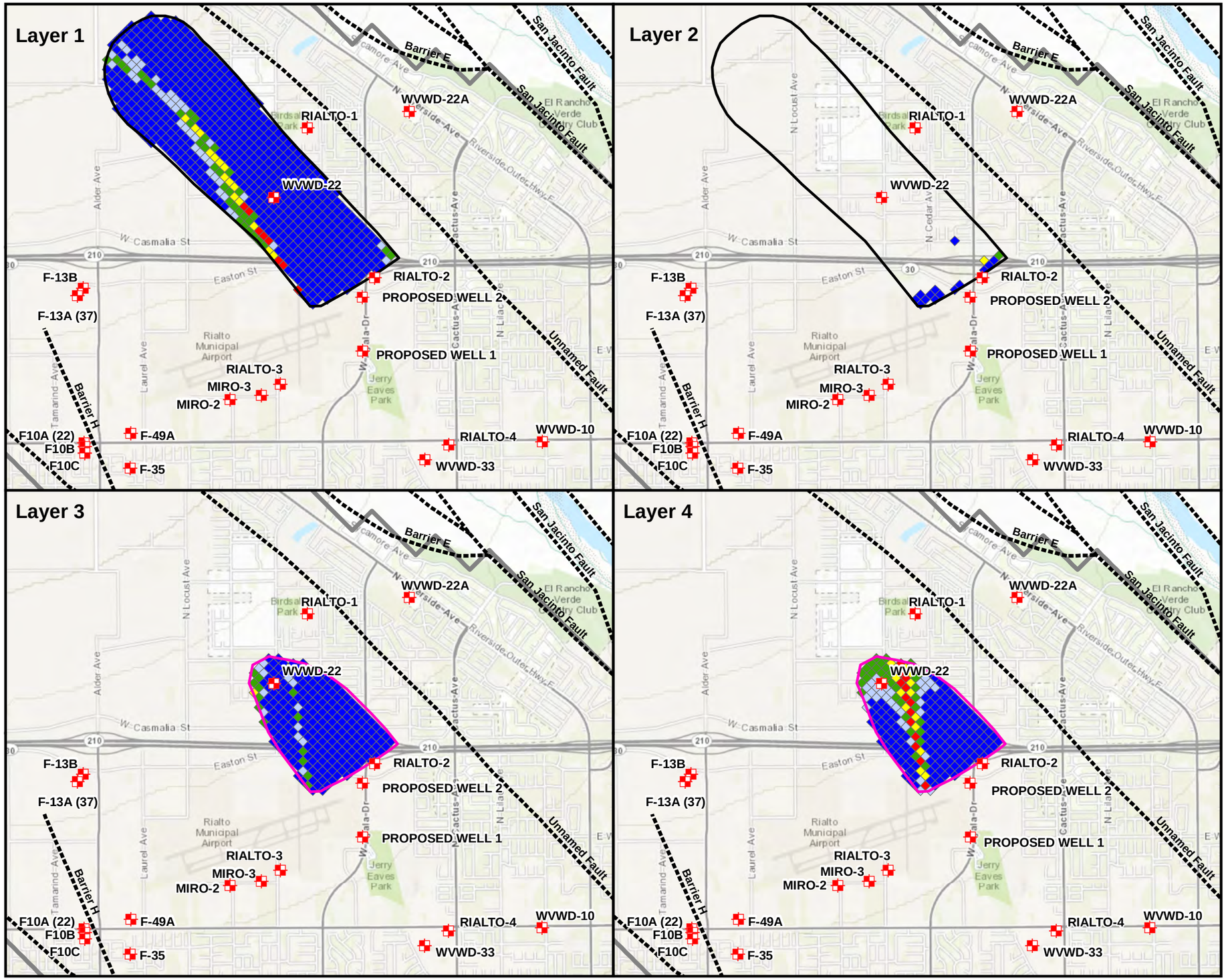


## Legend

- Production Well
- Faults

Frequency of Capture (%)

- < 40
- 40 to 60
- 60 to 80
- 80 to 90
- 90 to 100
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-60
SENSITIVITY ANALYSIS TO HORIZONTAL HYDRAULIC CONDUCTIVITY - SCENARIO 2D-1 FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_88.mxd

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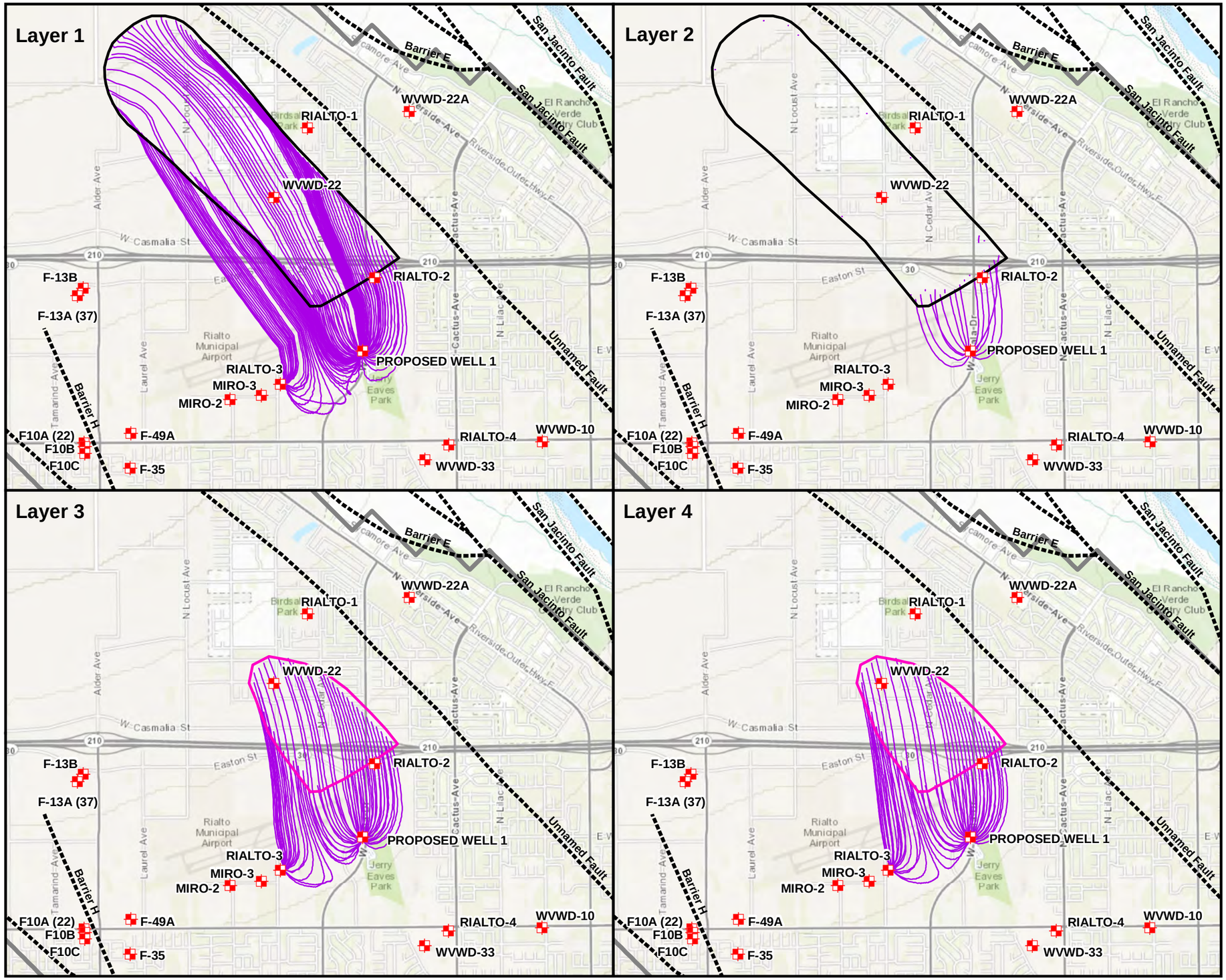


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-61
SENSITIVITY ANALYSIS TO LOW HORIZONTAL HYDRAULIC CONDUCTIVITY - SCENARIO 2B PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_89.mxd

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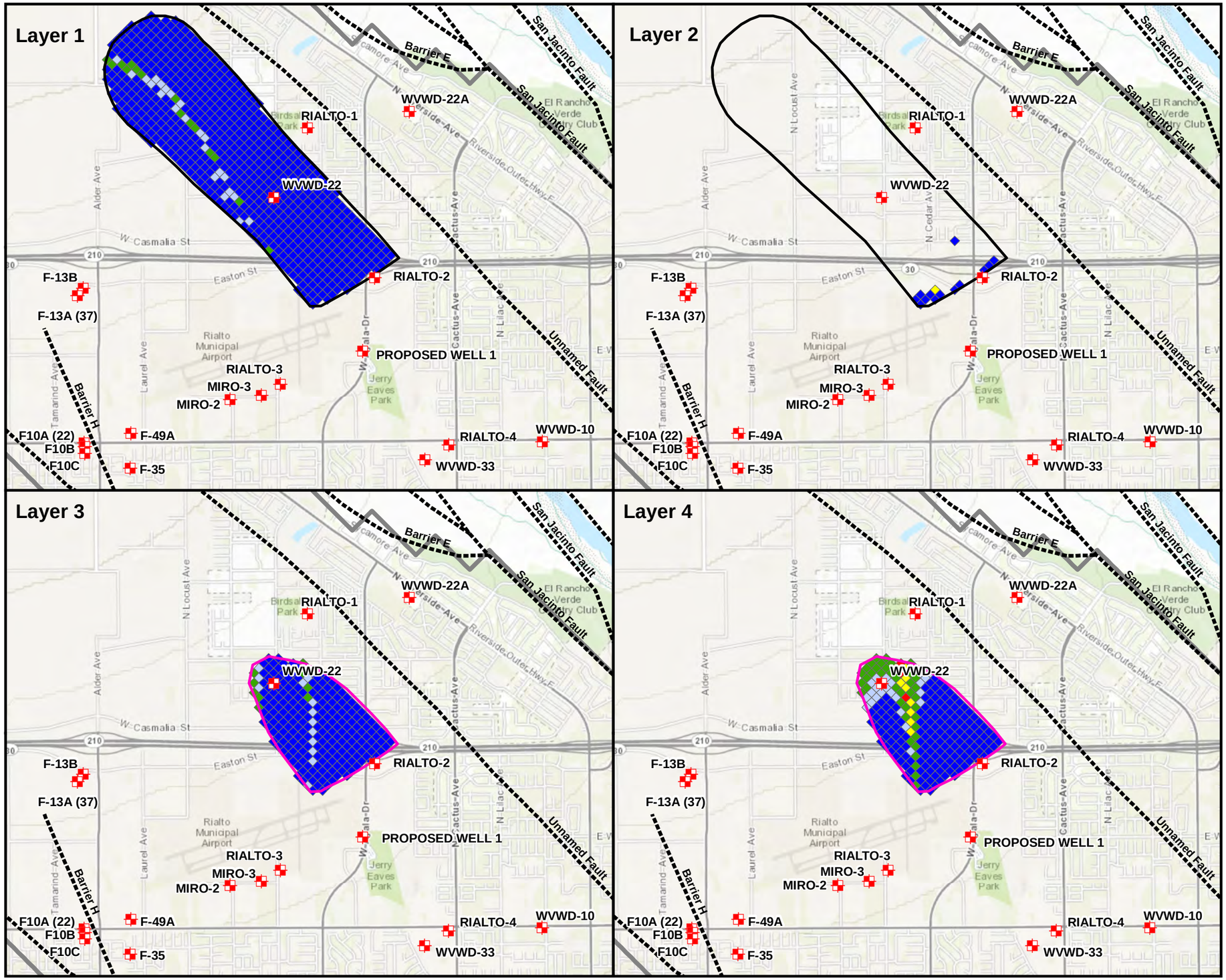


## Legend

- Production Well
- Faults
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-62
SENSITIVITY ANALYSIS TO
LOW HORIZONTAL HYDRAULIC
CONDUCTIVITY - SCENARIO 2B
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_90.mxd

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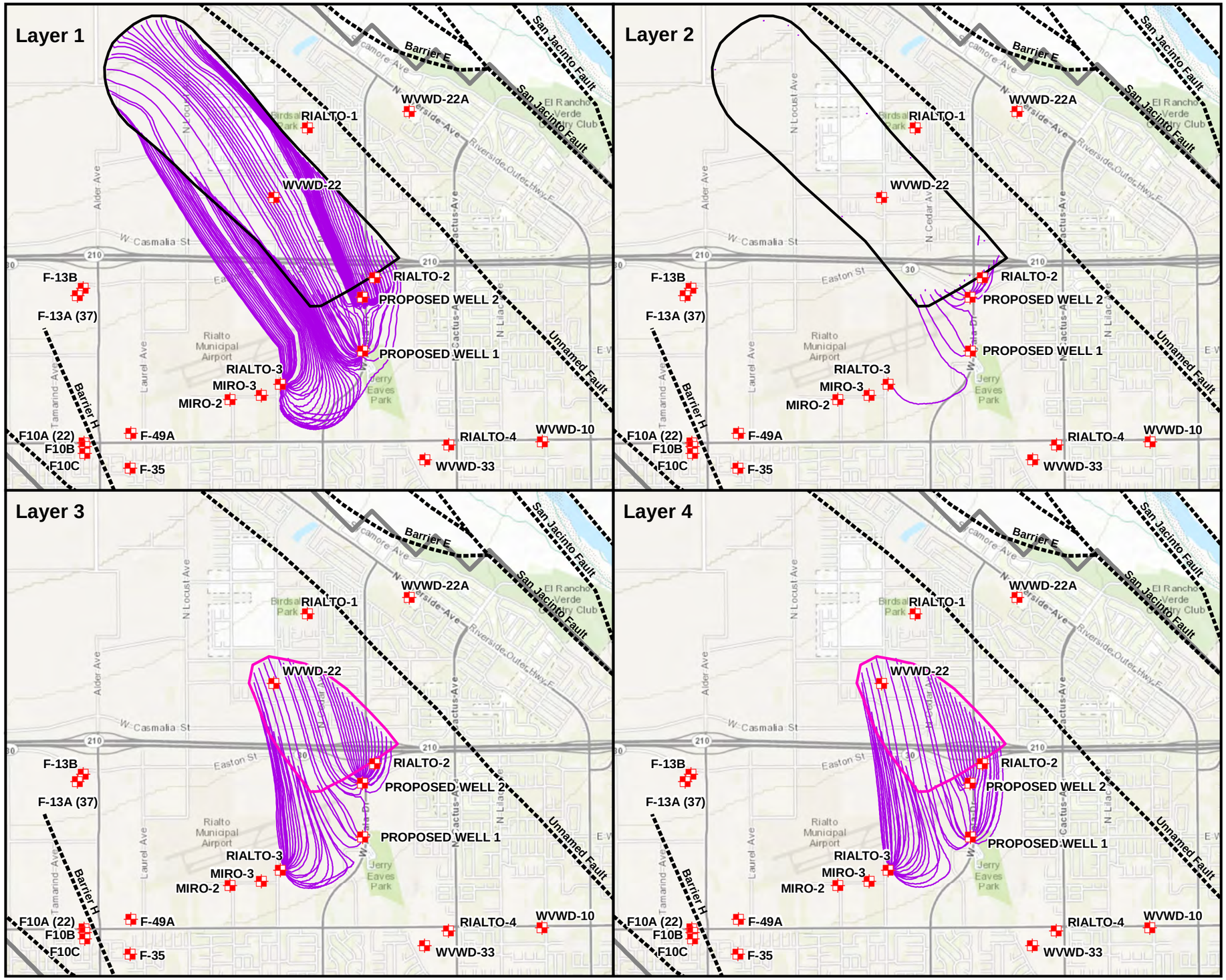


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-63
SENSITIVITY ANALYSIS TO LOW HORIZONTAL HYDRAULIC CONDUCTIVITY - SCENARIO 2D-1 PARTICLE TRACK SIMULATION

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962.03.A FILE: 0179962_91.mxd |
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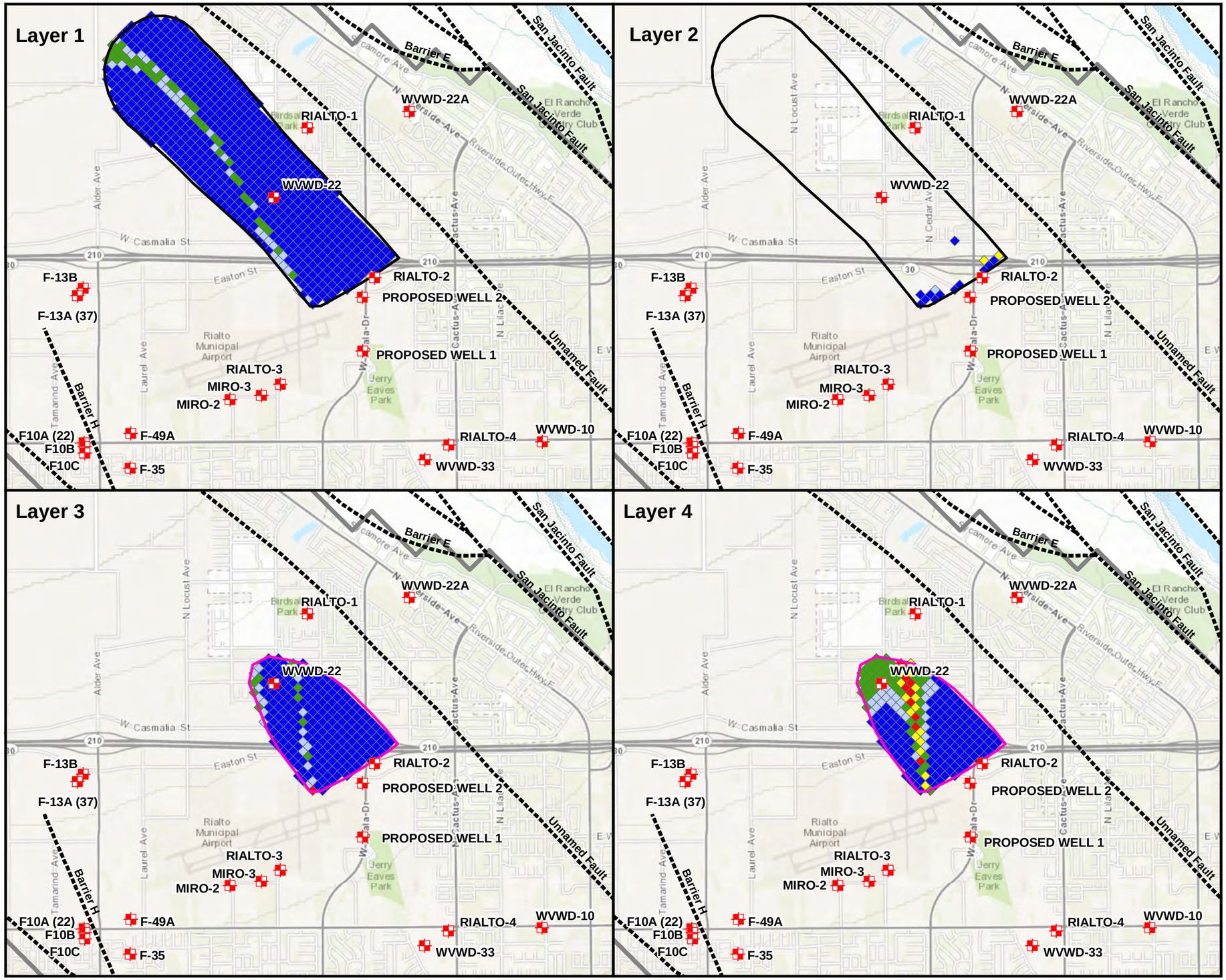


## Legend

- Production Well
- Faults
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Notes:
1) GPM = Gallons per Minute.
2) AF/yr = Acre-Feet per Year.

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-64
SENSITIVITY ANALYSIS TO
LOW HORIZONTAL HYDRAULIC
CONDUCTIVITY - SCENARIO 2D-1
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_92.mxd

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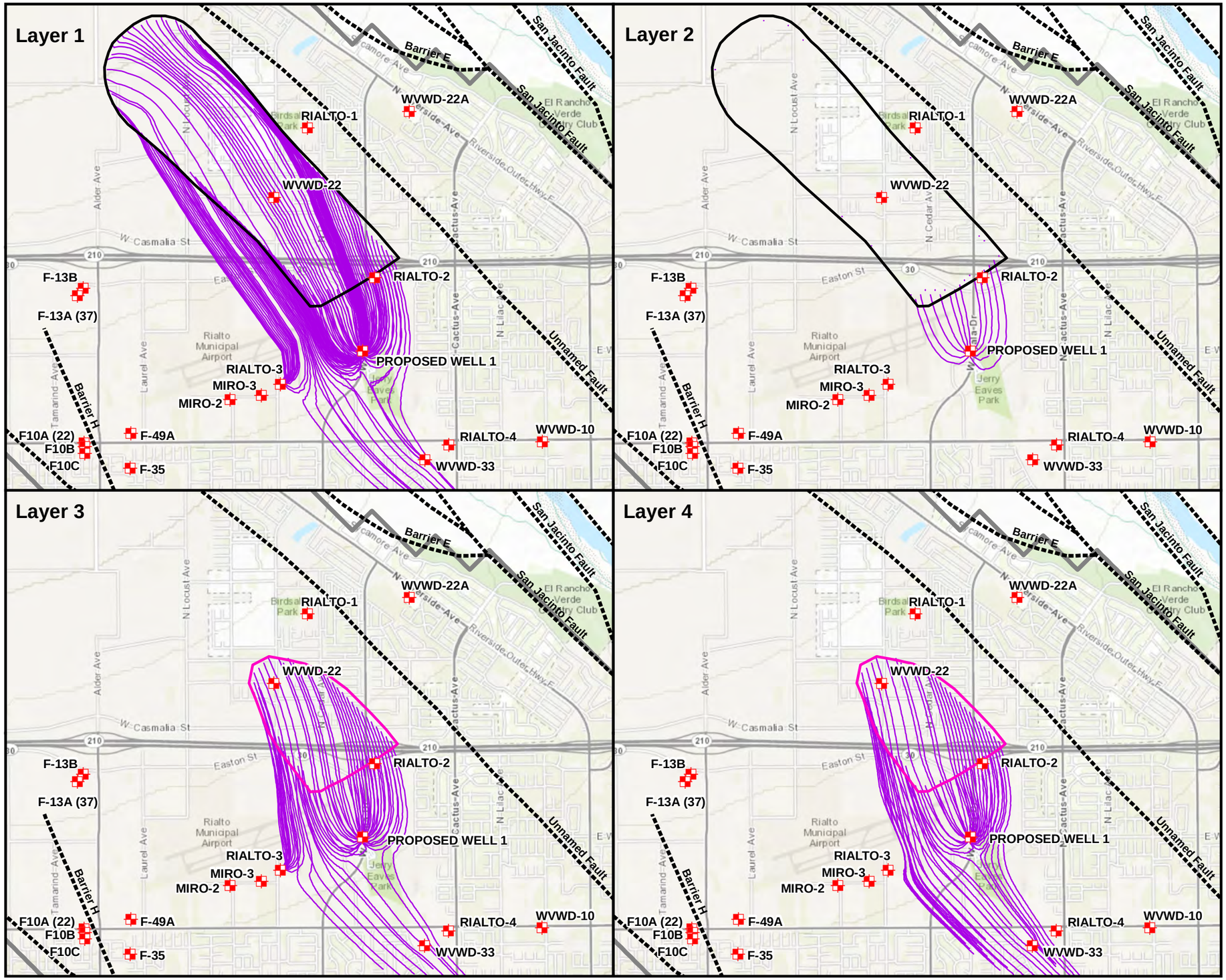


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Note: After 10 years, pumping in all wells reduced by 50%.

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-65
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN ALL WELLS - SCENARIO 2B PARTICLE TRACK SIMULATION

ERM

| PREPARED BY: RK (ERM) | JOB NO. 0179962.03.A<br>FILE: 0179962_93.mxd |
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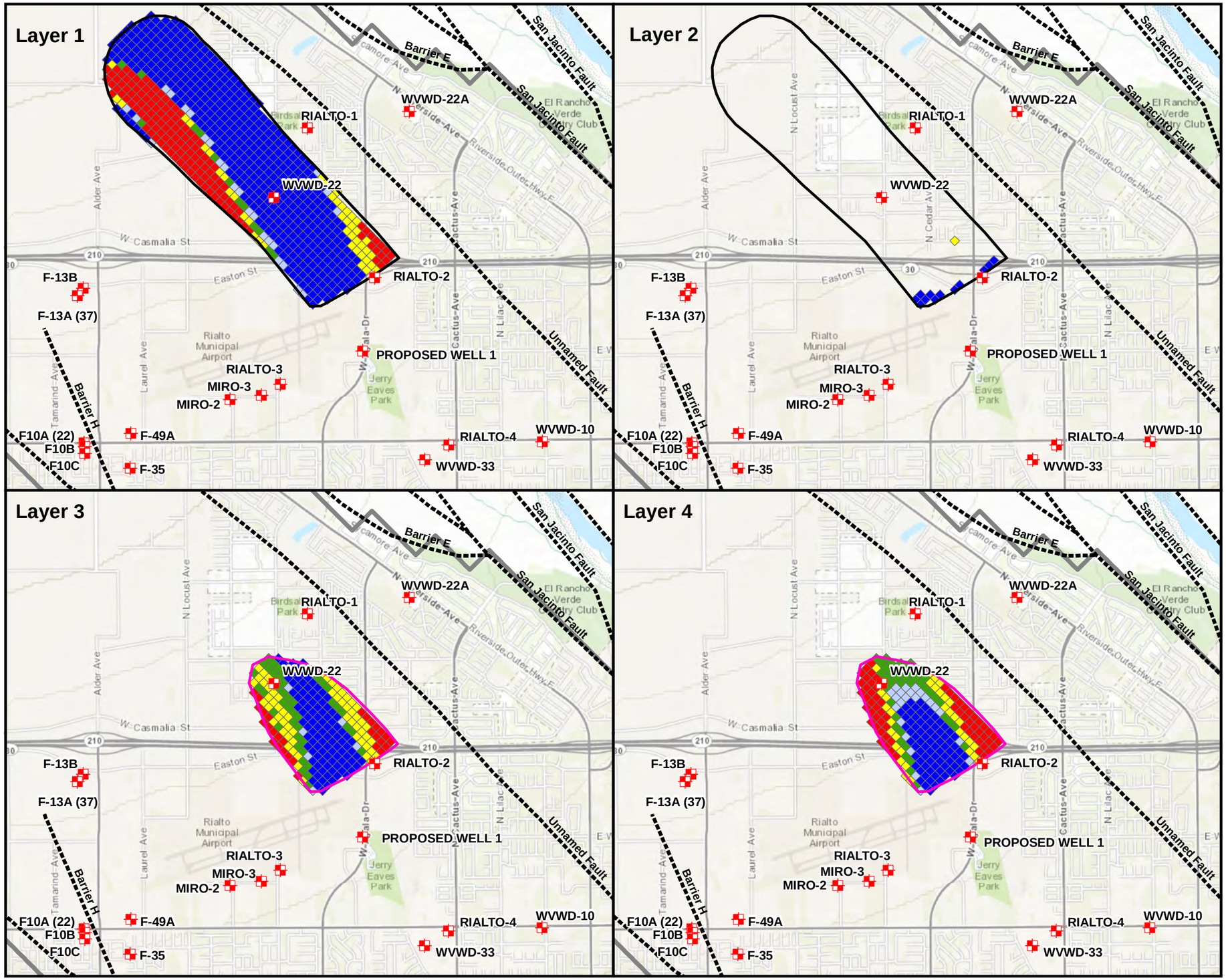


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Note:
After 10 years, pumping in all wells reduced by 50%.

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-66
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN ALL WELLS - SCENARIO 2B FREQUENCY OF CAPTURE

ERM

PREPARED BY:
RK (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_94.mxd

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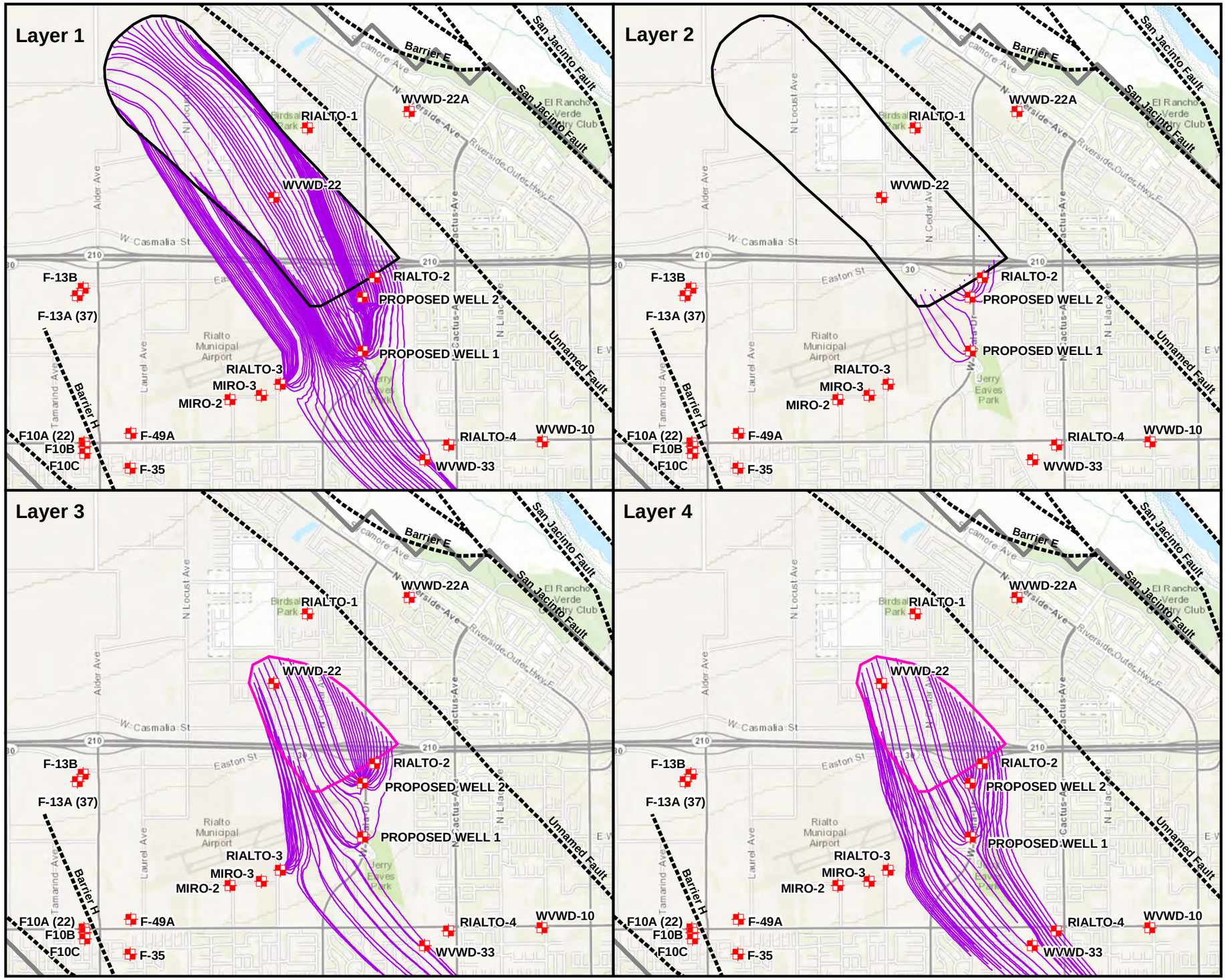


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Note:
After 10 years, pumping in all wells reduced by 50%

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-67
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN ALL WELLS - SCENARIO 2D-1 PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_95.mxd

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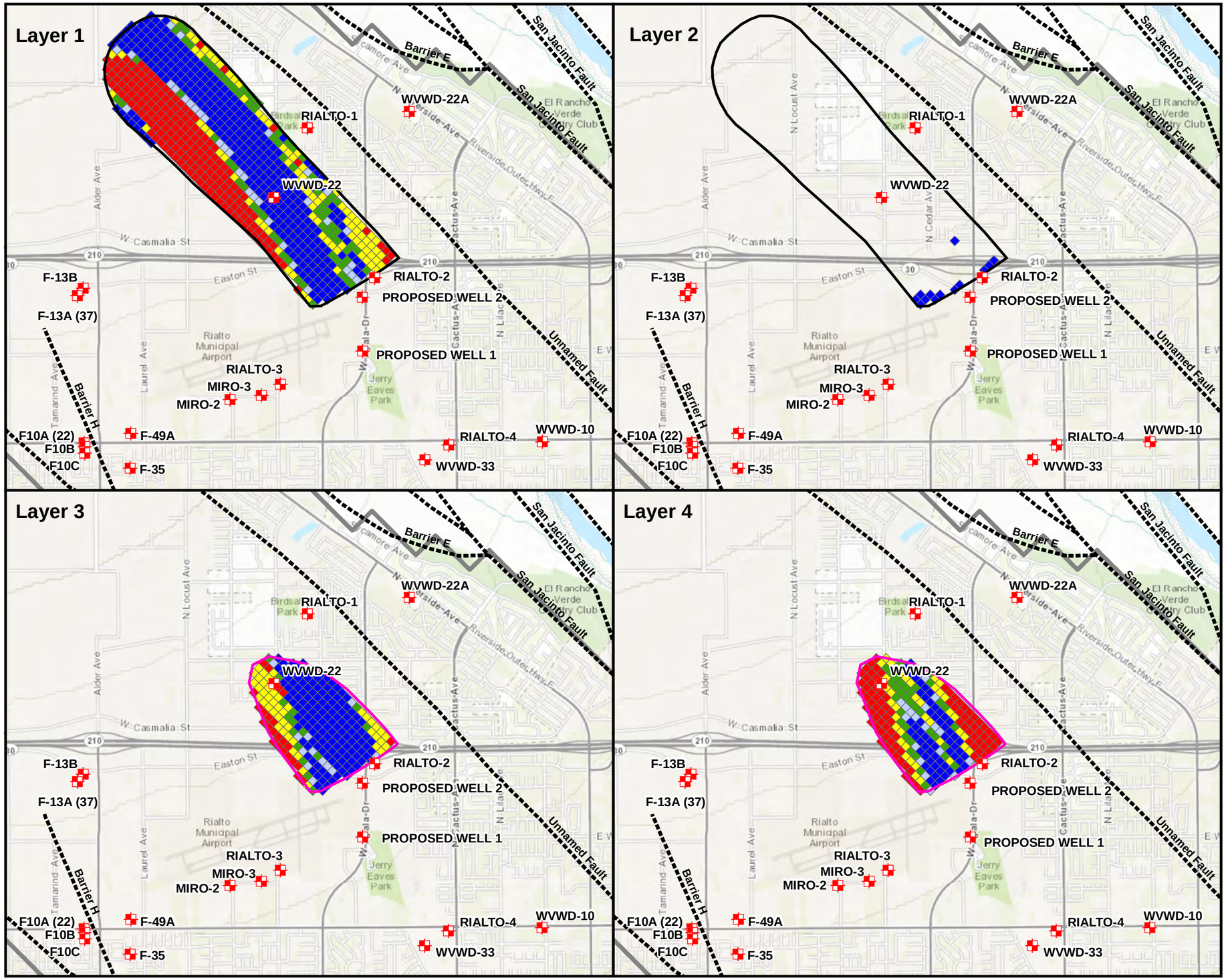


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Note:
After 10 years, pumping in all wells reduced by 50%

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-68
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN ALL WELLS - SCENARIO 2D-1 FREQUENCY OF CAPTURE

ERM

PREPARED BY:
RK (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_96.mxd

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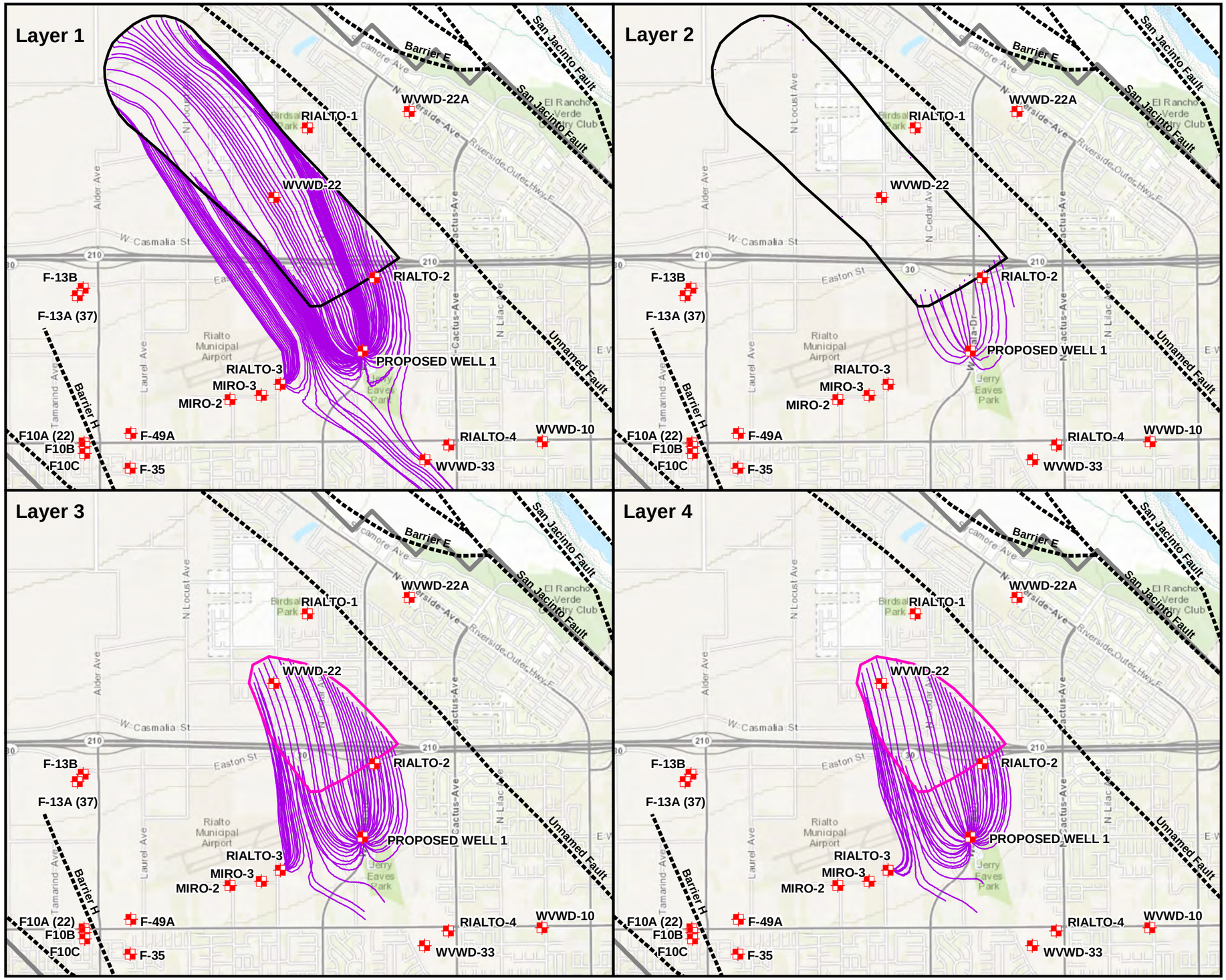


## Legend

- Production Well
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate Annual Average GPM | AF/yr | Range GPM |
|---|---|---|---|
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Note:
After 10 years, pumping in all non-remedy wells reduced by 50%

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-69
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN NON-REMEDY WELLS - SCENARIO 2B PARTICLE TRACK SIMULATION

ERM

PREPARED BY: CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_97.mxd

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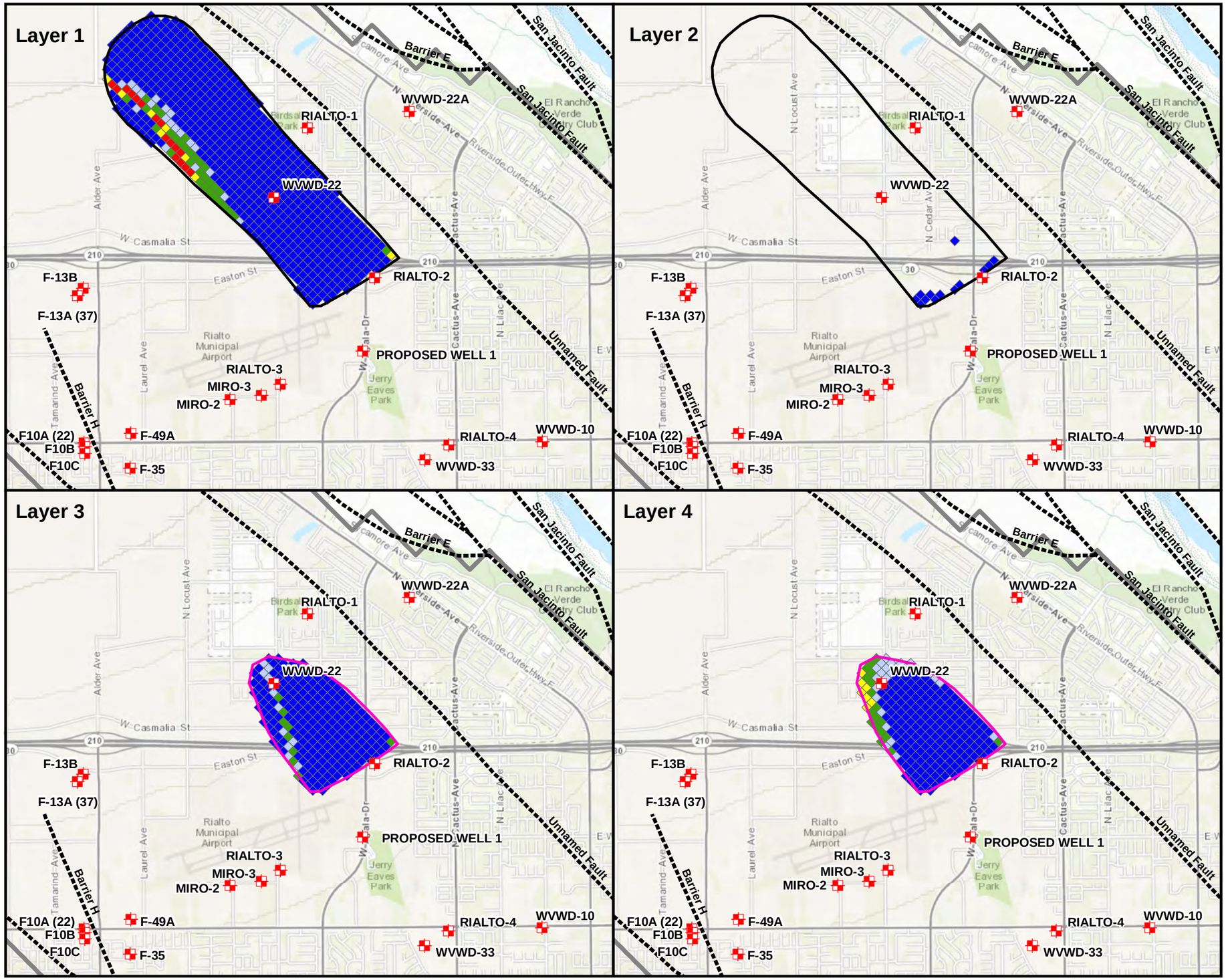


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 1,859 | 3,000 | 1,267 - 2,086 |
| Proposed Well 2 | 0 | 0 | 0 |
| Total Flow Rate | 3,016 | 4,868 | 2,055 - 3,386 |

Note:
After 10 years, pumping in all non-remedy wells reduced by 50%

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-70
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN NON-REMEDY WELLS - SCENARIO 2B FREQUENCY OF CAPTURE

ERM

PREPARED BY:
CTALBOT (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_98.mxd

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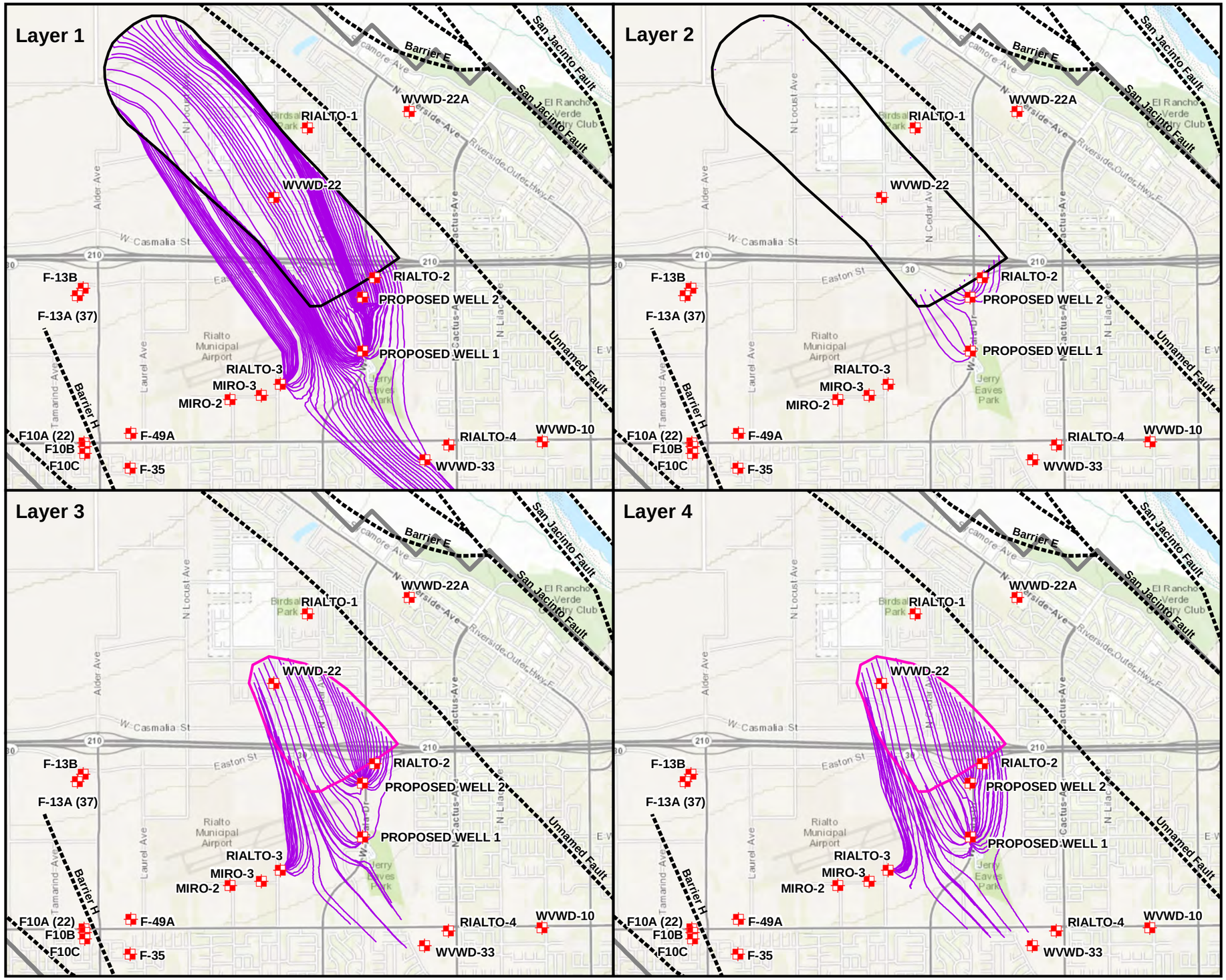


## Legend

- Production Well
- Regional Aquifer Target Capture Zone
- Model Particle Tracks
- Faults
- Intermediate Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Note:
After 10 years, pumping in all non-remedy wells reduced by 50%

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-71
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN NON-REMEDY WELLS - SCENARIO 2D-1
PARTICLE TRACK SIMULATION

ERM

PREPARED BY:
RK (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_99.mxd

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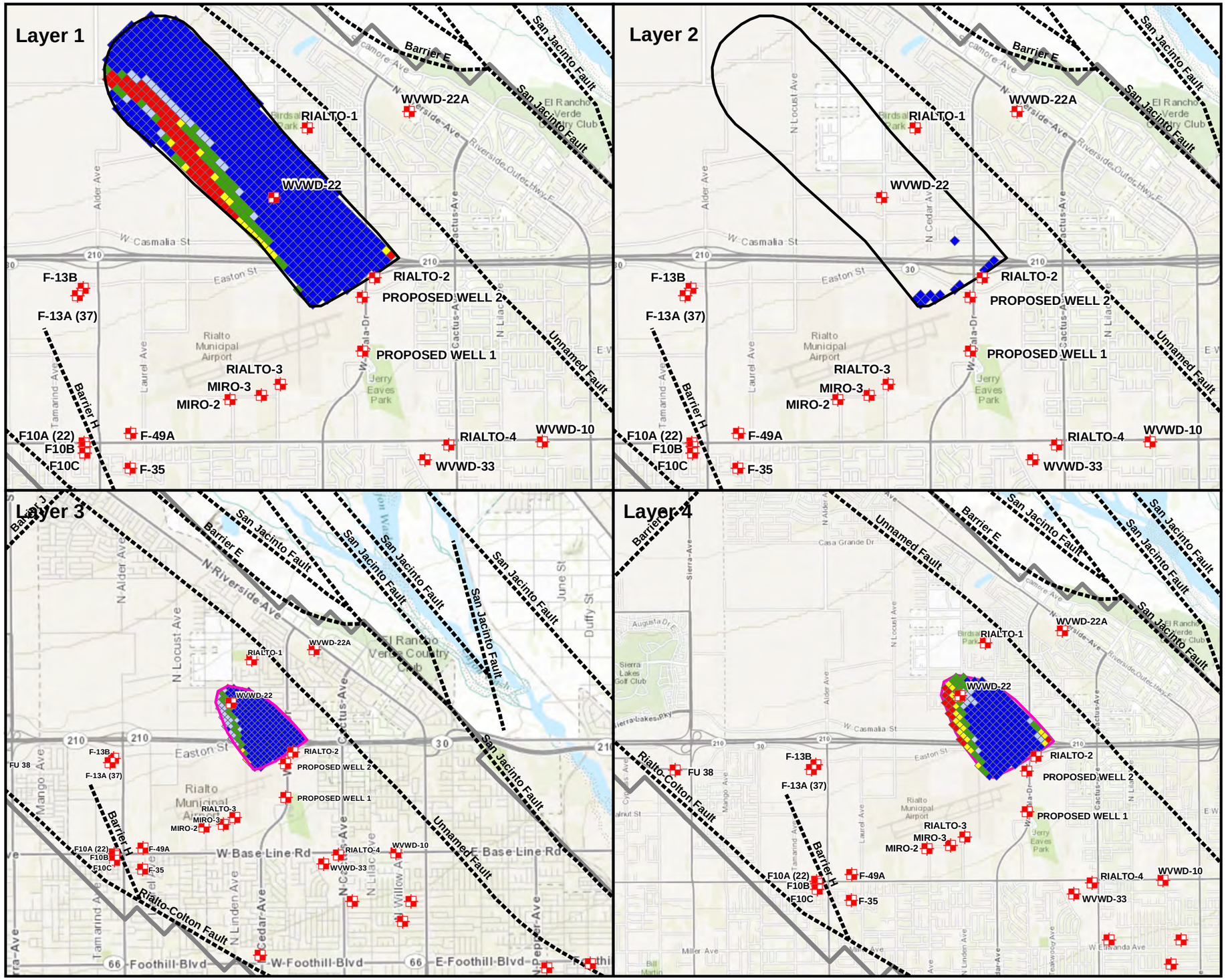


## Legend

- Production Well
- Frequency of Capture (%)
  - < 40
  - 40 to 60
  - 60 to 80
  - 80 to 90
  - 90 to 100
- Faults
- Intermediate Aquifer Target Capture Zone
- Regional Aquifer Target Capture Zone
- Model Boundary

| Well | Pumping Rate | | |
|---|---|---|---|
| | Annual Average | | Range |
| | GPM | AF/yr | GPM |
| Rialto-2 | 0 | 0 | 0 |
| Rialto-3 | 1,157 | 1,868 | 789 - 1,299 |
| Miro-2 | 0 | 0 | 0 |
| Miro-3 | 0 | 0 | 0 |
| Proposed Well 1 | 929 | 1,500 | 633 - 1,043 |
| Proposed Well 2 | 743 | 1,200 | 507 - 835 |
| Total Flow Rate | 2,830 | 4,568 | 1,928 - 3,177 |

Note:
After 10 years, pumping in all non-remedy wells reduced by 50%

Note:
GPM - Gallons per Minute
AF/yr - Acre-Feet per Year

Reference:
Esri (c) 2013 and its data suppliers.

N

0 3,000
Feet

SOURCE AREA OPERABLE UNIT
B.F. GOODRICH SUPERFUND SITE

FIGURE 5-72
SENSITIVITY ANALYSIS TO REDUCED PUMPING IN NON-REMEDY WELLS - SCENARIO 2D-1
FREQUENCY OF CAPTURE

ERM

PREPARED BY:
RK (ERM)

JOB NO. 0179962.03.A
FILE: 0179962_100.mxd

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*Tables*

*Table 5-1* *Baseline Pumping Rates for Predictive Scenarios (gpm)*
*Source Area Operable Unit - B.F. Goodrich Superfund Site*

| Well | Reported 2011 Pumping Rate | Predictive Pumping Rate in Model | | | | |
|---|---|---|---|---|---|---|
| | | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Annual Average |
| Colton-9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colton-15 | 289 | 0 | 0 | 0 | 0 | 0 |
| Colton-17 | 818 | 0 | 0 | 0 | 0 | 0 |
| Colton-22 | 379 | 0 | 0 | 0 | 0 | 0 |
| Colton-23 | 599 | 0 | 0 | 0 | 0 | 0 |
| Colton-9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colton East | 0 | 0 | 0 | 0 | 0 | 0 |
| F-10A22 | 0 | 0 | 0 | 0 | 0 | 0 |
| F-10B | 1,200 | 1,294 | 1,341 | 1,346 | 817 | 1,200 |
| F-10C | 902 | 973 | 1,008 | 1,013 | 615 | 902 |
| F-13B | 874 | 943 | 977 | 981 | 596 | 874 |
| F-15A | 624 | 673 | 697 | 700 | 425 | 624 |
| F35 | 0 | 0 | 0 | 0 | 0 | 0 |
| F49A | 1,449 | 1,562 | 1,619 | 1,626 | 987 | 1,449 |
| FU37 or F-13A37 | 1,009 | 1,089 | 1,128 | 1,133 | 688 | 1,009 |
| FU38 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rialto-1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rialto-4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rialto-5 | 209 | 9 | 250 | 484 | 94 | 209 |
| Rialto-6 | 0 | 1,078 | 1,117 | 1,122 | 681 | 999 |
| Rialto-7 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-10 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-11 | 803 | 1,078 | 1,117 | 1,122 | 681 | 999 |
| WVWD-16 | 520 | 259 | 268 | 270 | 164 | 240.1 |
| WVWD-17 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-22 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-22A | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-23 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-24 | 410 | 423 | 449 | 407 | 360 | 410 |
| WVWD-33 | 673 | 259 | 268 | 270 | 164 | 240.1 |
| WVWD-54 | 609 | 668 | 692 | 695 | 422 | 620 |
| 1 AC #58 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8F2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barton Road | 105 | 113 | 117 | 118 | 71 | 105 |
| CR4 | 0 | 0 | 0 | 0 | 0 | 0 |
| CR4A | 0 | 0 | 0 | 0 | 0 | 0 |
| Edmunds | 0 | 0 | 0 | 0 | 0 | 0 |
| Johnson 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MDWC 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| Meeks 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mill | 0 | 0 | 0 | 0 | 0 | 0 |
| Sperry Well | 63 | 68 | 70 | 70 | 43 | 63 |
| Vaughn 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Villelli 1 | 0 | 0 | 0 | 0 | 0 | 0 |

*Table 5-1* *Baseline Pumping Rates for Predictive Scenarios (gpm)*
*Source Area Operable Unit - B.F. Goodrich Superfund Site*

| Well | Reported 2011 Pumping Rate | Predictive Pumping Rate in Model | | | | |
|---|---|---|---|---|---|---|
| | | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Annual Average |
| Wells Varied Under Pumping Scenarios | | | | | | |
| Scenario 1A | | | | | | |
| Rialto-2 | 0 | 2,157 | 2,235 | 2,245 | 1,363 | 2,000 |
| Rialto-3 | 1,157 | 1,758 | 1,822 | 1,830 | 1,111 | 1,630 |
| Total | | 3,915 | 4,057 | 4,075 | 2,473 | 3,630 |
| Scenario 1B | | | | | | |
| Rialto-2 | 0 | 1,197 | 1,241 | 1,246 | 757 | 1,110 |
| Rialto-3 | 1,157 | 1,758 | 1,822 | 1,830 | 1,111 | 1,630 |
| Miro-2 | 0 | 879 | 911 | 915 | 555 | 815 |
| Miro-3 | 0 | 879 | 911 | 915 | 555 | 815 |
| Total | | 4,713 | 4,884 | 4,905 | 2,978 | 4,370 |
| Scenario 2A | | | | | | |
| Rialto-2 | 0 | 334 | 346 | 348 | 211 | 310 |
| Rialto-3 | 1,157 | 1,537 | 1,593 | 1,600 | 971 | 1,425 |
| Proposed Well -1 | 0 | 1,671 | 1,731 | 1,739 | 1,055 | 1,549 |
| Total | | 3,542 | 3,670 | 3,686 | 2,238 | 3,284 |
| Scenario 2B | | | | | | |
| Rialto-3 | 1,157 | 1,248 | 1,293 | 1,299 | 789 | 1,157 |
| Proposed Well -1 | 0 | 2,005 | 2,077 | 2,086 | 1,267 | 1,859 |
| Total | | 3,253 | 3,371 | 3,386 | 2,055 | 3,016 |
| Scenario 2C | | | | | | |
| Rialto-3 | 1,157 | 1,248 | 1,293 | 1,299 | 789 | 1,157 |
| Miro-2 | 0 | 863 | 894 | 898 | 545 | 800 |
| Miro-3 | 0 | 863 | 894 | 898 | 545 | 800 |
| Proposed Well -1 | 0 | 1,348 | 1,397 | 1,404 | 852 | 1,250 |
| Total | | 4,322 | 4,479 | 4,498 | 2,731 | 4,007 |
| Scenario 2D-1 | | | | | | |
| Rialto-3 | 1,157 | 1,248 | 1,293 | 1,299 | 789 | 1,157 |
| Proposed Well -1 | 0 | 1,002 | 1,039 | 1,043 | 633 | 929 |
| Proposed Well-2 | 0 | 802 | 831 | 835 | 507 | 743 |
| Total | | 3,052 | 3,163 | 3,177 | 1,928 | 2,830 |
| Scenario 2D-2 | | | | | | |
| Rialto-3 | 1,157 | 1,248 | 1,293 | 1,299 | 789 | 1,157 |
| Proposed Well -1 | 0 | 1,336 | 1,385 | 1,391 | 844 | 1,239 |
| Proposed Well-2 | 0 | 1,002 | 1,039 | 1,043 | 633 | 929 |
| Total | | 3,587 | 3,717 | 3,733 | 2,266 | 3,326 |
| Scenario 2D-3 | | | | | | |
| Rialto-3 | 1,157 | 1,248 | 1,293 | 1,299 | 789 | 1,157 |
| Proposed Well -1 | 0 | 1,336 | 1,385 | 1,391 | 844 | 1,239 |
| Proposed Well-2 | 0 | 1,002 | 1,039 | 1,043 | 633 | 929 |
| Total | | 3,587 | 3,717 | 3,733 | 2,266 | 3,326 |

Notes:
All results on the table are in gallons per minute (gpm).

1. The quarterly distribution of pumping for these wells varies by alternative. This quarterly pumping patterns are based on pumping patterns (percentage of annual average) for other wells where monthly or quarterly data is available:
   - 1st Quarter - 27% of annual average
   - 2nd Quarter - 28%
   - 3rd Quarter - 28%
   - 4th Quarter - 17%

Abbreviations:
WVWD = West Valley Water District

*Table 5-2* *Baseline Pumping Rates for Predictive Scenarios (AF/yr)*
*Source Area Operable Unit - B.F. Goodrich Superfund Site*

| Well | Reported 2011 Pumping Rate | Predictive Pumping Rate in Model | | | | |
|---|---|---|---|---|---|---|
| | | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Annual Average |
| Colton-9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colton-15 | 467 | 0 | 0 | 0 | 0 | 0 |
| Colton-17 | 1,321 | 0 | 0 | 0 | 0 | 0 |
| Colton-22 | 611 | 0 | 0 | 0 | 0 | 0 |
| Colton-23 | 966 | 0 | 0 | 0 | 0 | 0 |
| Colton-9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colton East | 0 | 0 | 0 | 0 | 0 | 0 |
| F-10A22 | 0 | 0 | 0 | 0 | 0 | 0 |
| F-10B | 1,936 | 2,088 | 2,164 | 2,173 | 1,319 | 1,936 |
| F-10C | 1,456 | 1,570 | 1,627 | 1,634 | 992 | 1,456 |
| F-13B | 1,411 | 1,522 | 1,577 | 1,584 | 961 | 1,411 |
| F-15A | 1,007 | 1,086 | 1,125 | 1,130 | 686 | 1,007 |
| F35 | 0 | 0 | 0 | 0 | 0 | 0 |
| F49A | 2,338 | 2,522 | 2,613 | 2,624 | 1,593 | 2,338 |
| FU37 or F-13A37 | 1,629 | 1,757 | 1,821 | 1,829 | 1,110 | 1,629 |
| FU38 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rialto-1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rialto-4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rialto-5 | 338 | 15 | 403 | 781 | 152 | 338 |
| Rialto-6 | 0 | 1,740 | 1,803 | 1,811 | 1,099 | 1,613 |
| Rialto-7 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-10 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-11 | 1,296 | 1,740 | 1,803 | 1,811 | 1,099 | 1,613 |
| WVWD-16 | 840 | 418 | 433 | 435 | 264 | 387.5 |
| WVWD-17 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-22 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-22A | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-23 | 0 | 0 | 0 | 0 | 0 | 0 |
| WVWD-24 | 661 | 682 | 724 | 657 | 581 | 661 |
| WVWD-33 | 1,086 | 418 | 433 | 435 | 264 | 387.5 |
| WVWD-54 | 983 | 1,079 | 1,118 | 1,123 | 681 | 1,000 |
| 1 AC #58 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8F2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barton Road | 169 | 182 | 189 | 190 | 115 | 169 |
| CR4 | 0 | 0 | 0 | 0 | 0 | 0 |
| CR4A | 0 | 0 | 0 | 0 | 0 | 0 |
| Edmunds | 0 | 0 | 0 | 0 | 0 | 0 |
| Johnson 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MDWC 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| Meeks 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mill | 0 | 0 | 0 | 0 | 0 | 0 |
| Sperry Well | 101 | 109 | 113 | 113 | 69 | 101 |
| Vaughn 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Villelli 1 | 0 | 0 | 0 | 0 | 0 | 0 |

*Table 5-2* *Baseline Pumping Rates for Predictive Scenarios (AF/yr)*
*Source Area Operable Unit - B.F. Goodrich Superfund Site*

| Well | Reported 2011 Pumping Rate | Predictive Pumping Rate in Model | | | | |
|---|---|---|---|---|---|---|
| | | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Annual Average |
| Wells Varied Under Pumping Scenarios | | | | | | |
| Scenario 1A | | | | | | |
| Rialto-2 | 0 | 3,481 | 3,608 | 3,624 | 2,200 | 3,228 |
| Rialto-3 | 1,868 | 2,838 | 2,940 | 2,953 | 1,793 | 2,631 |
| Total | | 6,319 | 6,548 | 6,577 | 3,992 | 5,859 |
| Scenario 1B | | | | | | |
| Rialto-2 | 0 | 1,933 | 2,003 | 2,012 | 1,221 | 1,792 |
| Rialto-3 | 1,868 | 2,838 | 2,940 | 2,953 | 1,793 | 2,631 |
| Miro-2 | 0 | 1,418 | 1,470 | 1,476 | 896 | 1,315 |
| Miro-3 | 0 | 1,418 | 1,470 | 1,476 | 896 | 1,315 |
| Total | | 7,607 | 7,882 | 7,917 | 4,806 | 7,053 |
| Scenario 2A | | | | | | |
| Rialto-2 | 0 | 539 | 559 | 561 | 341 | 500 |
| Rialto-3 | 1,868 | 2,481 | 2,570 | 2,582 | 1,567 | 2,300 |
| Proposed Well -1 | 0 | 2,696 | 2,794 | 2,806 | 1,703 | 2,500 |
| Total | | 5,716 | 5,923 | 5,949 | 3,611 | 5,300 |
| Scenario 2B | | | | | | |
| Rialto-3 | 1,868 | 2,015 | 2,088 | 2,097 | 1,273 | 1,868 |
| Proposed Well -1 | 0 | 3,236 | 3,353 | 3,368 | 2,044 | 3,000 |
| Total | | 5,250 | 5,440 | 5,464 | 3,317 | 4,868 |
| Scenario 2C | | | | | | |
| Rialto-3 | 1,868 | 2,015 | 2,088 | 2,097 | 1,273 | 1,868 |
| Miro-2 | 0 | 1,392 | 1,443 | 1,449 | 880 | 1,291 |
| Miro-3 | 0 | 1,392 | 1,443 | 1,449 | 880 | 1,291 |
| Proposed Well -1 | 0 | 2,176 | 2,255 | 2,265 | 1,375 | 2,018 |
| Total | | 6,976 | 7,228 | 7,261 | 4,407 | 6,468 |
| Scenario 2D-1 | | | | | | |
| Rialto-3 | 1,868 | 2,015 | 2,088 | 2,097 | 1,273 | 1,868 |
| Proposed Well -1 | 0 | 1,618 | 1,676 | 1,684 | 1,022 | 1,500 |
| Proposed Well-2 | 0 | 1,294 | 1,341 | 1,347 | 818 | 1,200 |
| Total | | 4,927 | 5,105 | 5,128 | 3,113 | 4,568 |
| Scenario 2D-2 | | | | | | |
| Rialto-3 | 1,868 | 2,015 | 2,088 | 2,097 | 1,273 | 1,868 |
| Proposed Well -1 | 0 | 2,157 | 2,235 | 2,245 | 1,363 | 2,000 |
| Proposed Well-2 | 0 | 1,618 | 1,676 | 1,684 | 1,022 | 1,500 |
| Total | | 5,789 | 5,999 | 6,026 | 3,658 | 5,368 |
| Scenario 2D-3 | | | | | | |
| Rialto-3 | 1,868 | 2,015 | 2,088 | 2,097 | 1,273 | 1,868 |
| Proposed Well -1 | 0 | 2,157 | 2,235 | 2,245 | 1,363 | 2,000 |
| Proposed Well-2 | 0 | 1,618 | 1,676 | 1,684 | 1,022 | 1,500 |
| Total | | 5,789 | 5,999 | 6,026 | 3,658 | 5,368 |

Notes:

All units are acre-feet per year.

1. The quarterly distribution of pumping for these wells varies by alternative. This quarterly pumping patterns are based on pumping patterns (percentage of annual average) for other wells where monthly or quarterly data is available:
   - 1st Quarter - 27% of annual average
   - 2nd Quarter - 28%
   - 3rd Quarter - 28%
   - 4th Quarter - 17%

Abbreviations:

WVWD = West Valley Water District

## *Table 5-3 Predictive Scenarios (gpm)*
## *Source Area Operable Unit - B.F. Goodrich Superfund Site*

| Well | Scenario 1 [1] | | Scenario 2 [1] | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **A** | **B** | **A** | **B** | **C** | **D-1** | **D-2** | **D-3** |
| Rialto-2 | 2,000 | 1,110 | 310 | 0 | 0 | 0 | 0 | 0 |
| Rialto-3 | 1,630 | 1,630 | 1,425 | 1,157 | 1,157 | 1,157 | 1,157 | 1,157 |
| Miro-2 | 0 | 815 | 0 | 0 | 800 | 0 | 0 | 0 |
| Miro-3 | 0 | 815 | 0 | 0 | 800 | 0 | 0 | 0 |
| Proposed Well -1 | 0 | 0 | 1,549 | 1,859 | 1,250 | 929 | 1,239 | 1,239 |
| Proposed Well -2 | 0 | 0 | 0 | 0 | 0 | 743 | 929 | 929 |
| Total Flow Rate | 3,630 | 4,370 | 3,284 | 3,016 | 4,007 | 2,830 | 3,326 | 3,326 |
| Average Frequency of Capture [2] | **89%** | **98%** | **97%** | **96%** | **99%** | **94%** | **99%** | **99%** |

Notes:

All results on the table are in gpm.

1. This table presents annual average pumping rates. See Table 5-1 for quarterly pumping rates.

2. Average Frequency of Capture is the average of the frequency of capture for cells within Layers 1, 3, and 4.

Abbreviations:

AF/yr = Acre-feet per year
gpm = Gallons per minute
RAO = Remedial Action Objectives

**Scenario Descriptions:**

Scenario 1 – Assess whether RAOs are achievable using existing wells (Rialto 2, Rialto 3, Miro-2, and Miro-3).

Scenario 2 – Assess whether RAOs are achievable using a combination of existing well(s) and new well(s).

- Scenarios 2A, B, and C include 1 new extraction well.
- Scenarios 2D-1, 2D-2, and 2D-3 assume different locations of two new extraction wells.

**Major Assumptions/Constraints used in Developing the Modeling Scenarios:**

- Rialto-3 currently operates at 1,157 gpm and operational flow rates varies seasonally between 1,900 gpm and 900 gpm.
- Maximum flow rates for County wells under current water level conditions are: Rialto-3 = 1,630 gpm; Miro-2 = 2,200 gpm; and Miro-3 = 2,200 gpm.
- Available water rights:
  - County Remedy: 1,300 gpm from Rialto and 120 gpm from Colton
  - Emhart: 1,950 gpm from Colton and potentially up to 1,000 gpm from West Valley Water District
  - Combined: 3,370 gpm (4,370 gpm with West Valley Water District)

## *Table 5-4 Predictive Scenarios (AF/yr)*
## *Source Area Operable Unit - B.F. Goodrich Superfund Site*

| Well | Scenario 1 [1] | | Scenario 2 [1] | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **A** | **B** | **A** | **B** | **C** | **D-1** | **D-2** | **D-3** |
| Rialto-2 | 3,228 | 1,792 | 500 | 0 | 0 | 0 | 0 | 0 |
| Rialto-3 | 2,631 | 2,631 | 2,300 | 1,868 | 1,868 | 1,868 | 1,868 | 1,868 |
| Miro-2 | 0 | 1,315 | 0 | 0 | 1,291 | 0 | 0 | 0 |
| Miro-3 | 0 | 1,315 | 0 | 0 | 1,291 | 0 | 0 | 0 |
| Proposed Well -1 | 0 | 0 | 2,500 | 3,000 | 2,018 | 1,500 | 2,000 | 2,000 |
| Proposed Well -2 | 0 | 0 | 0 | 0 | 0 | 1,200 | 1,500 | 1,500 |
| Total Flow Rate | 5,859 | 7,053 | 5,300 | 4,868 | 6,468 | 4,568 | 5,368 | 5,368 |
| Average Frequency of Capture [2] | **89%** | **98%** | **97%** | **96%** | **99%** | **94%** | **99%** | **99%** |

Notes:

All results on the table are in gpm.

1. This table presents annual average pumping rates. See Table 5-1 for quarterly pumping rates.

2. Average Frequency of Capture is the average of the frequency of capture for cells within Layers 1, 3, and 4.

Abbreviations:

AF/yr = Acre-feet per year

gpm = Gallons per minute

RAO = Remedial Action Objectives

**Scenario Descriptions:**

Scenario 1 – Assess whether RAOs are achievable using existing wells (Rialto 2, Rialto 3, Miro-2, and Miro-3).

Scenario 2 – Assess whether RAOs are achievable using a combination of existing well(s) and new well(s).

- Scenarios 2A, B, and C include 1 new extraction well.
- Scenarios 2D-1, 2D-2, and 2D-3 assume different locations of two new extraction wells.

**Major Assumptions/Constraints used in Developing the Modeling Scenarios:**

- Rialto-3 currently operates at 1,157 gpm and operational flow rates varies seasonally between 1,900 gpm and 900 gpm.
- Maximum flow rates for County wells under current water level conditions are: Rialto-3 = 1,630 gpm; Miro-2 = 2,200 gpm; and Miro-3 = 2,200 gpm.
- Available water rights:
  - County Remedy: 1,300 gpm from Rialto and 120 gpm from Colton
  - Emhart: 1,950 gpm from Colton and potentially up to 1,000 gpm from West Valley Water District
  - Combined: 3,370 gpm (4,370 gpm with West Valley Water District)