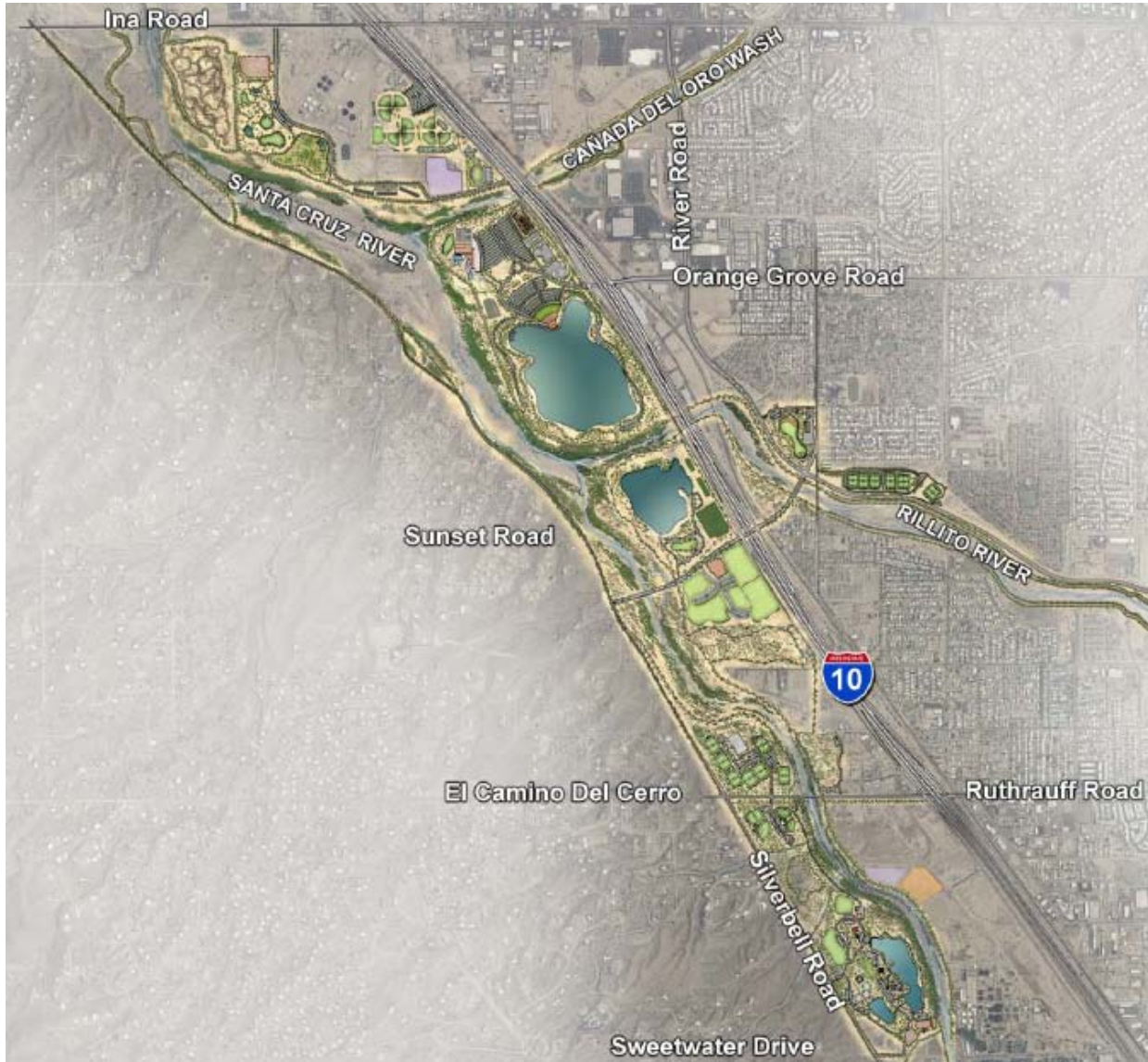


Hydrologic Evaluation of the Corazon de Tres Rios Del Norte Area



BY
Frank Postillion, Chief
Hydrologist
&
David Scalero, Principal
Hydrologist

Pima County Regional
FLOOD CONTROL
DISTRICT



CTRDN



CTRDN



**Figure 5:
Sunset Road**

CTRDN



Orange Grove Pit 2008



MIKE JACOBS SPORTS PARK CONCEPT PLAN

KEYMAP



OPTIONAL
ATV & MTN BIKE
CENTER

Ina Road

INA ROAD
TREATMENT
PLANT

SPORTS PARK
EXPANSION

SOLAR ENERGY
FACILITY

VELODROME

REGIONAL
K-9 CENTER

DE ANZA TRAIL

FUTURE RIVER TRAIL

REMOTE CONTROL
AIRPLANE PARK

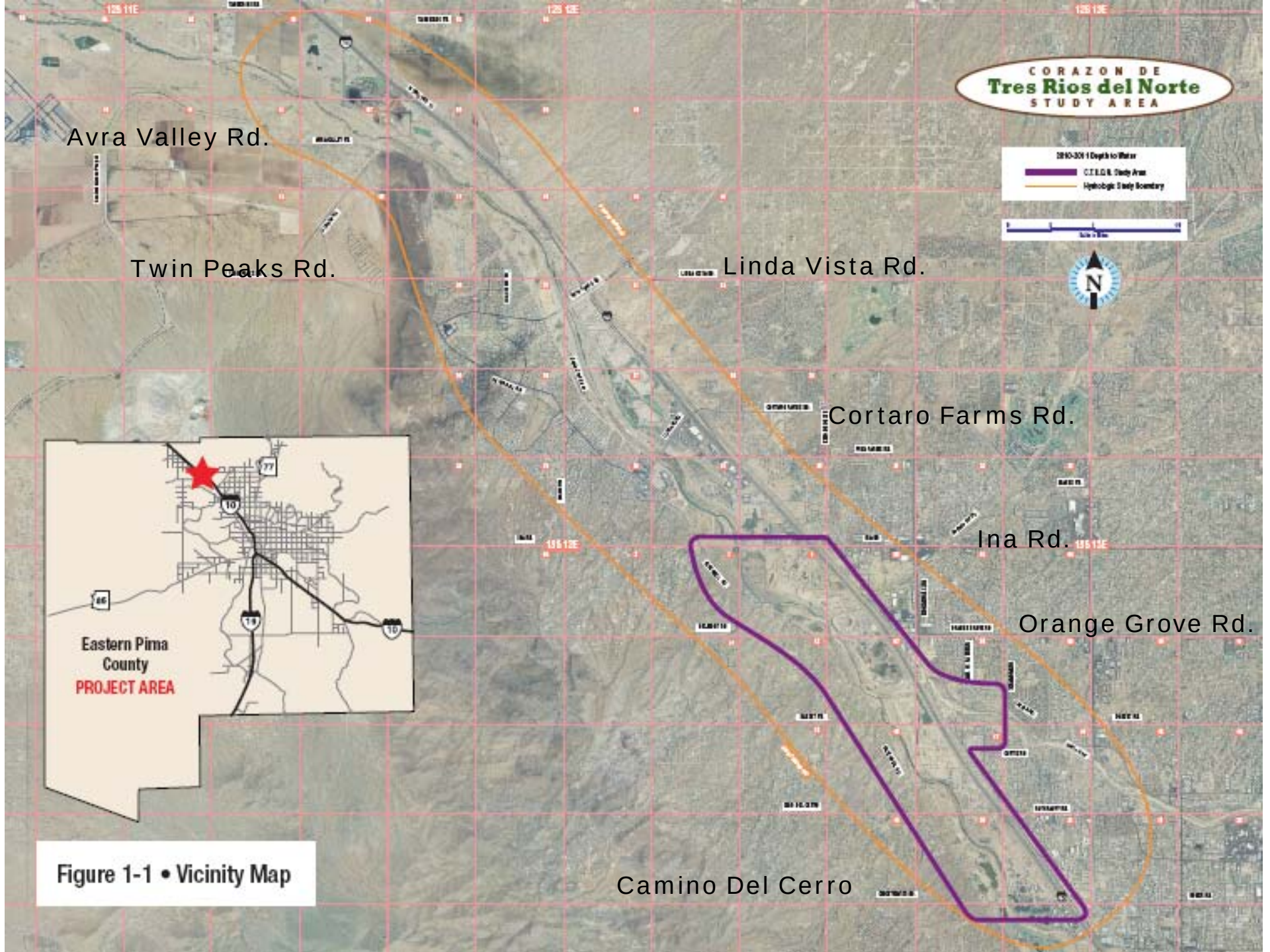
RECREATION &
AQUATIC CENTER

CAÑADA DEL ORO WASH

Silverbell Road

SANTA CRUZ RIVER

Figure 9: Ina Road



Avra Valley Rd.

Twin Peaks Rd.

Linda Vista Rd.

Cortaro Farms Rd.

Ina Rd.

Orange Grove Rd.

Camino Del Cerro



Figure 1-1 • Vicinity Map

Data Sources

- ADWR's Groundwater Site Inventory (GWSI)
- Pima County (RWRD & DEQ/SW)
- Tucson Water
- Cortaro-Marana Irrigation District (CMID)
- December 2010-March 2011 data used for DTW and Water Elevations
- Data from previous years used when needed as a supplement

Subsurface Geology

- Alluvial Deposits
 - Sands & Gravels
 - 50 to 100 feet thick
 - Highly Permeable (rapid recharge of water)
- Fort Lowell Formation
 - Sand, Clayey Sand, Gravel & Sandy-Gravelly Clay
 - ~ 50 feet thick
 - Highly Permeable (rapid recharge of water)
- Tinaja Beds
 - Unconsolidated/Semi-consolidated Sands, Clay & Clayey Sand and Gravel
 - 600 to 800 feet thick (200 feet west of Santa Cruz Fault)
 - Primary water bearing unit (water supply)

Subsurface Geology

- Pantano Formation
 - Silty/Pebbly Sandstone, Mudstone & Gypsiferous Mudstone to moderately Cemented Gravel
 - Unproductive for water supply
- Tucson Mountain Bedrock
 - Fractured Volcanic Rock
 - As shallow as 400 feet bls west of SCR
 - 300 feet bls near Avra Valley Road
 - Unproductive water yield from large municipal wells

Current Water Table

- Groundwater movement
 - Northwesternly near Ruthrauff Rd.
 - Northerly near confluence of three rivers (SCR, Rillito and CDO)
 - Northwesternly north of Ina Rd.
- Groundwater Gradient
 - 10 feet/mile in southern portion
 - 7 feet/mile near confluence of three rivers
 - ~40 feet/mile from Ina Rd. to Cortaro Rd.
 - ~25 feet/mile northwest of Cortaro Rd.
- Water levels shallowest at confluence of SCR, Rillito and CDO

CORAZON DE
Tres Rios del Norte
STUDY AREA

2000-2011 Water Level Elevations

- 1/2" = 1'00" Depth to Water / Water Level Elevation / Data Measured
- Water Level Elevation Contour (ft. local)
- - - - - Coastal Line Where Indicated

0 1 2 3 4 Miles



Figure 3-1 • Groundwater Elevations Contour Map

Figure 3-1A
CTRDN Groundwater Study
Longitudinal Profile A - A'

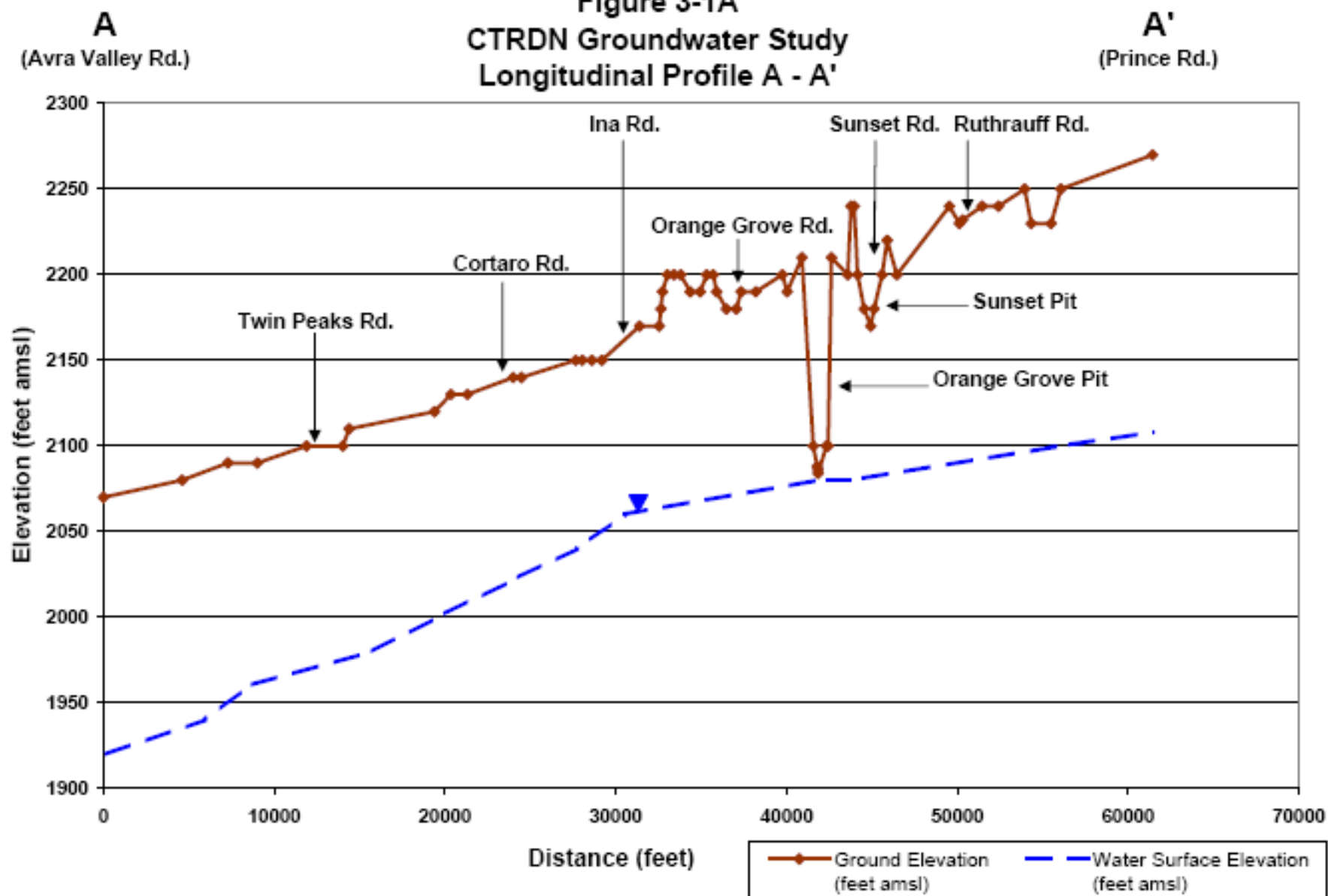
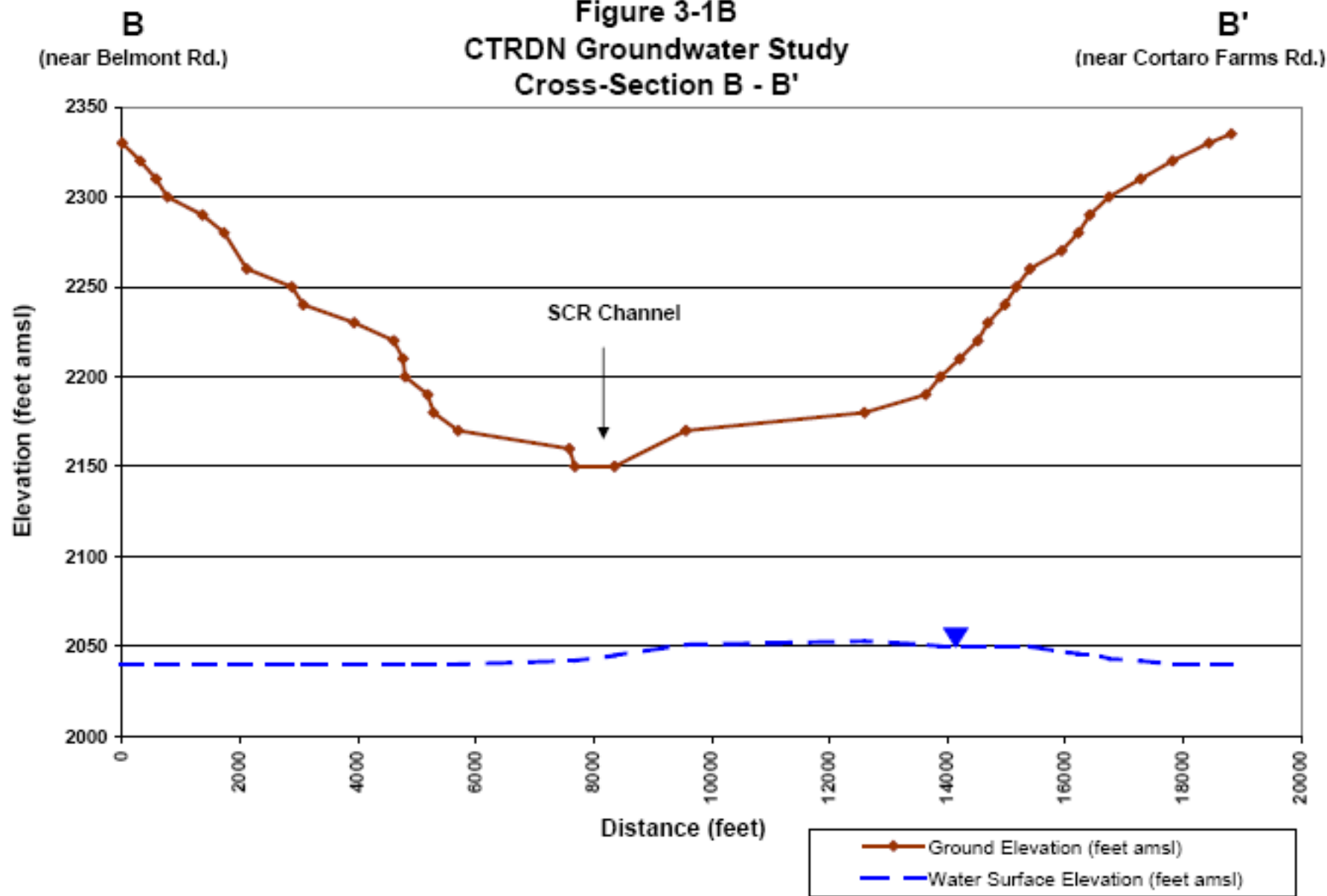


Figure 3-1B
CTRDN Groundwater Study
Cross-Section B - B'



Depth to Groundwater and Declines

- 150-160 feet bls south of SCR, Rillito & CDO confluence
- Gradual increase in water levels to less than 110 feet bls between CDO/SCR confluence and Cortaro Rd.
- 150-160 feet bls north of Cortaro Road
- 1.2 ft/yr avg. water level decline over last 29 yrs.
- 2.3 ft/yr avg. water level decline over last 11 years

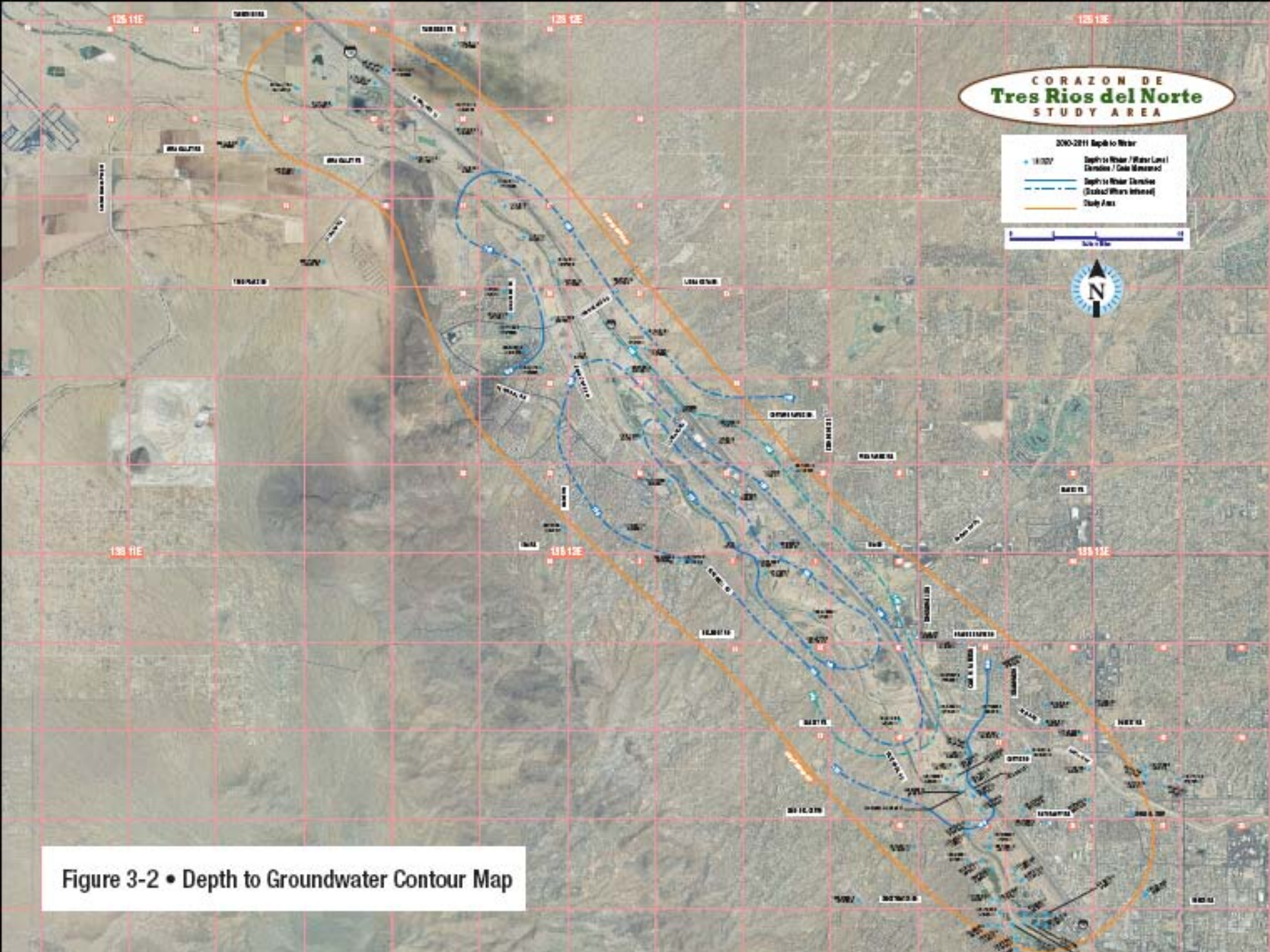


Figure 3-2 • Depth to Groundwater Contour Map

Recharge

- Storm water in SCR, Rillito & CDO
- Treated effluent from Roger Rd. & Ina Rd. Facilities
- Sweetwater → Effluent Recharge Facility



Tucson Water Graphic

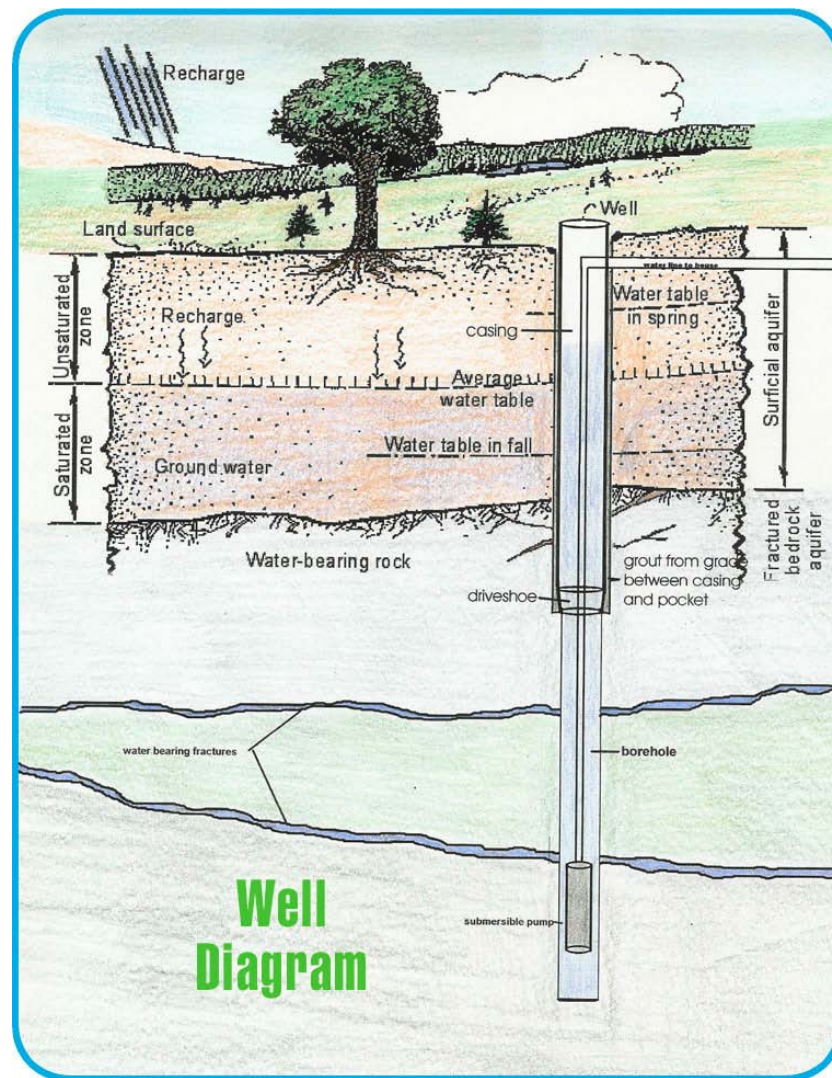
Effluent Recharge

- Recharge rates south of Ina Rd. varied from 0.5 – 5.9 AF/mi/day (3.33 avg.)
- Recharge rates north of Ina Rd. varied from 2.83 – 4.06 AF/mi/day (3.15 avg.)
- Historic recharge rates ranged from 4.4 – 6.7 AF/mi/day (wetter period)



Pumping

- 1984 -2009 pumping average of 17,100 AF/yr from Roger-Cortaro
- 1984-2009 pumping average of 20,400 AF/yr from Cortaro-Tangerine
- Primary pumping by Tucson Water & CMID

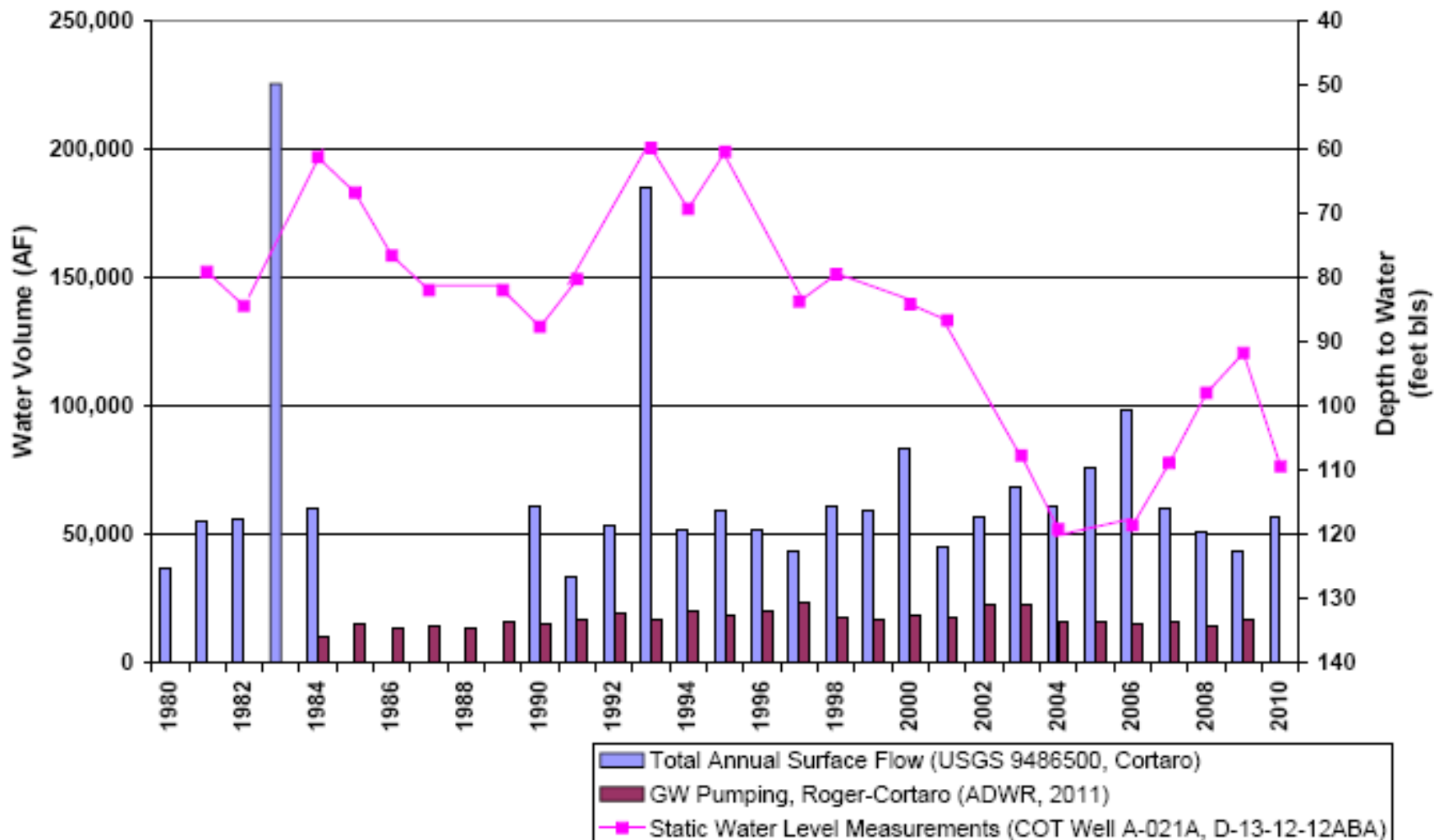


Water Balance

- Highest groundwater fluctuation occurs at SCR, Rillito & CDO confluences
- Water level recovery of 10-35 feet w/in one year of large floods recorded in 1983, 1993 and 2006
- WL recovery not sustained over time due to lesser flood flows and ongoing pumping
- Water Balance indicates net loss of water storage over last 10 years

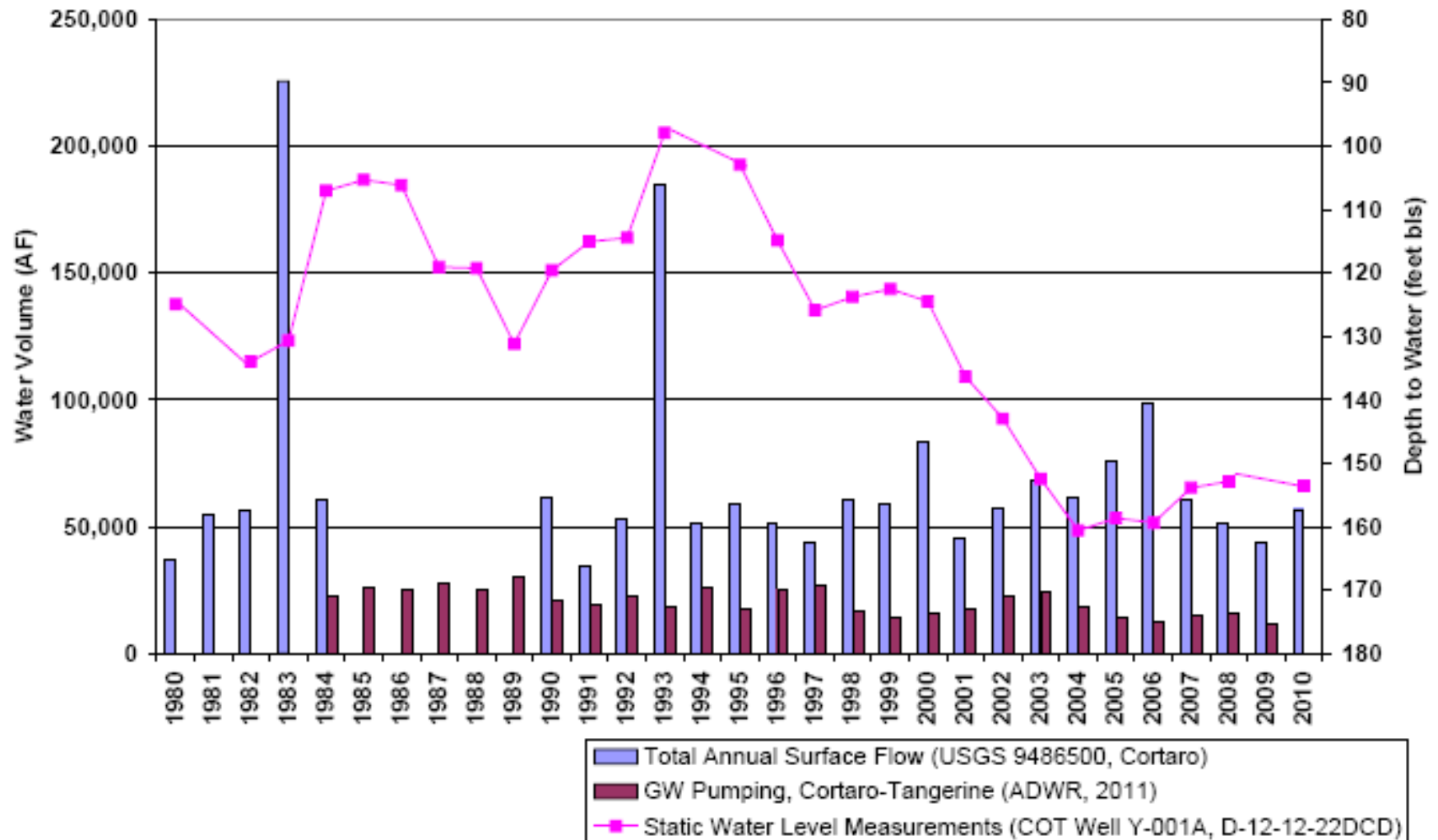
Water Balance

Figure 2-5
Runoff/Pumping (Roger Road - Cortaro Road)
vs. Depth to Groundwater (CDO to SCR Confluence Area)



Water Balance

Figure 2-6
Runoff/Pumping (Cortaro Road to Tangerine Road)
vs. Depth to Groundwater (between Cortaro and Twin Peaks Roads)



Recommendations

- Use data to update current TRDN model
- Use TRDN model to assess recharge and pumping scenarios
- Determine suitability for multi-purpose recharge and riparian restoration on District-owned property west of Orange Grove Pit



Recommendations

- Construct monitoring wells and evaluate seasonal and perched water levels near SCR & CDO confluence
- Further evaluate in-channel recharge from Cortaro Rd. to Avra Valley Rd.



Recommendations

- Optimize recharge in CTRDN area
 - Sustain riparian corridor
 - Maintain groundwater levels
- Obtain CalPort permission to access wells for long-term monitoring at CTRDN

