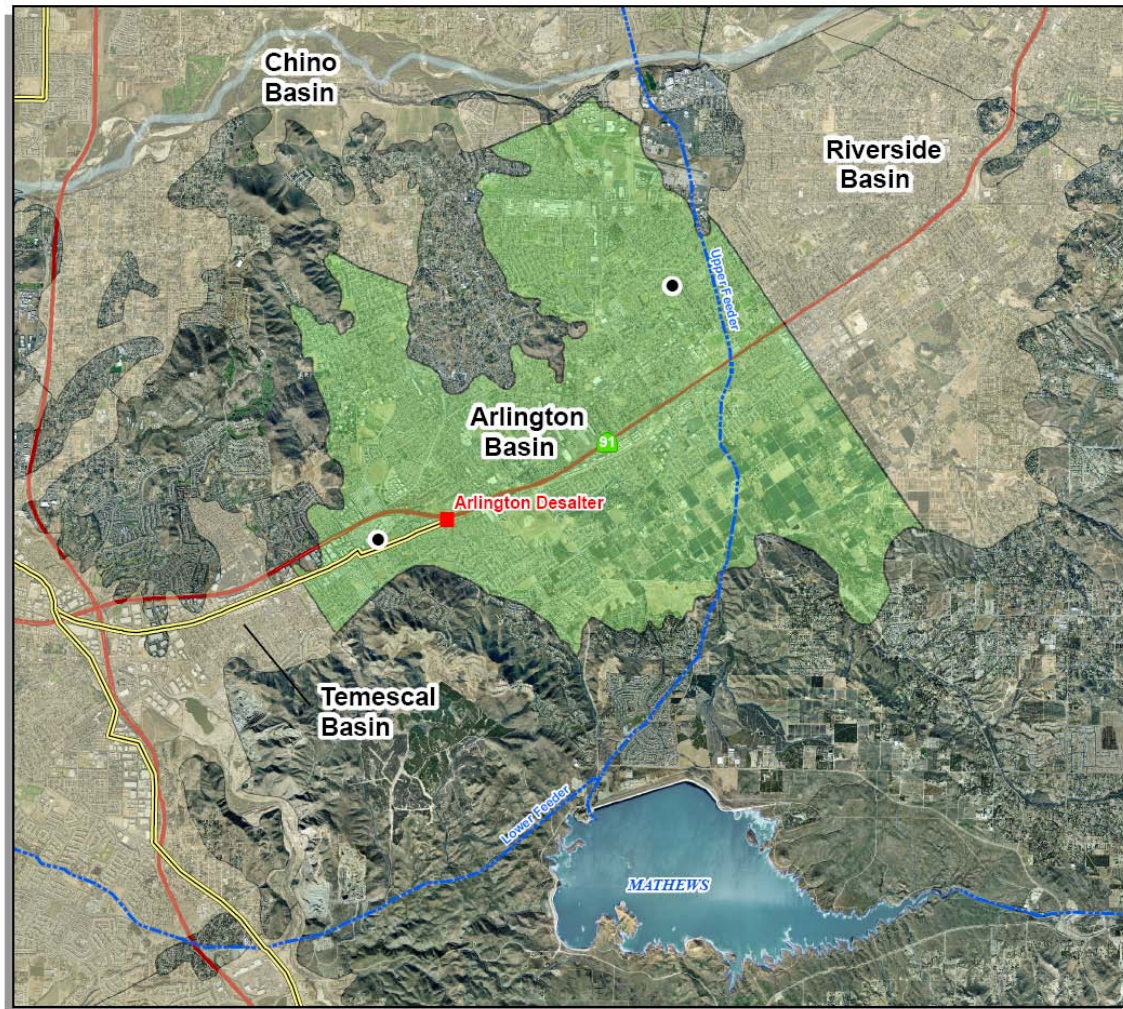


Chapter IV – Groundwater Basin Reports

Eastside Metropolitan Service Area Basins - Arlington Basin

The Arlington Basin is an unadjudicated groundwater basin located south of the Santa Ana River in northwestern Riverside County. The Arlington Basin includes the communities of Riverside and portions of unincorporated Riverside County. The Arlington Basin underlies the service area of Western Municipal Water District of Riverside County (Western MWD). A map of the basin is provided in **Figure 14-1**.

Figure 14-1
Map of the Arlington Basin



Arlington Basin

BASIN CHARACTERIZATION

The following section provides a physical description of the Arlington Basin including its geographic location and hydrogeologic character.

Basin Producing Zones and Storage Capacity

Groundwater occurrence in the Arlington Basin is generally unconfined. Groundwater producing zones in the Arlington Basin are characterized by considerable sand and little clay (DWR, 2004). Total storage in the basin is approximately 101,000 AF. Based upon Spring 2005 water levels there is about 69,000 AF in storage. Therefore, the unused storage space is approximately 32,000 AF. However, not all of the unsaturated portion can be used. The amount of unused storage space that could be used is unknown. Hydrogeologic data for the Arlington Basin are summarized in **Table 14-1**.

Table 14-1
Summary of Hydrogeologic Parameters of Arlington Basin

Parameter	Description
Structure	
Aquifer(s)	Unconfined alluvium
Depth of groundwater basin	0 to 300 feet
Yield and Storage	
Natural Safe Yield	8,300 AFY
Total Storage	101,000 AF
Unused Storage Space	32,000 AF
Portion of Unused Storage Space Available for Storage	Unknown

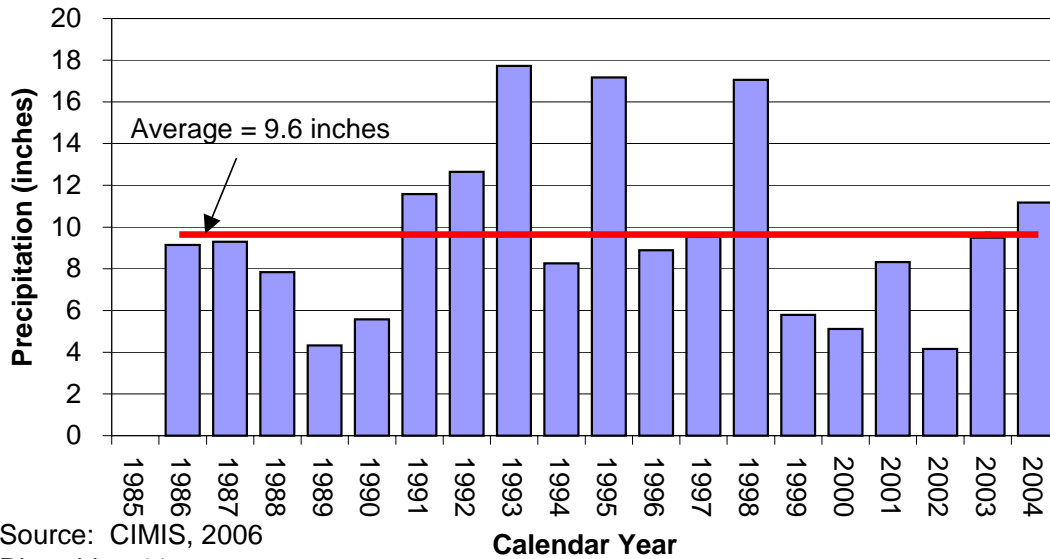
Safe Yield/Long-Term Balance of Recharge and Discharge

The Arlington Basin is replenished by infiltration from unlined stream channel overlying the basin, underflow from saturated alluvium and fractures within the bordering bedrock hills, return flows and percolation of precipitation (DWR, 2004; Wildermuth 2000, Wildermuth, 2006). Safe yield has not been determined for the Arlington Basin alone. Based upon a water budget analysis prepared by the City of Riverside (Riverside, 2005) for the combined Arlington-Riverside Basins, the long-term production from the Arlington Basin that yielded a balanced water budget was approximately 8,300 AFY.

The Arlington Basin is relatively dry with average precipitation of 9.6 inches per year. **Figure 14-2** provides the historical precipitation data from the CIMIS Riverside #44 Station

located near UC Riverside (CIMIS 2006). These data suggest below average precipitation from 1986 to 1990 and from 1999 to 2003, above average precipitation between 1991 and 1998 and since 2004.

Figure 14-2
Historical Precipitation near the Arlington Basin



GROUNDWATER MANAGEMENT

The following section describes how the Arlington Basin is currently managed.

Basin Governance

The Arlington Basin is not adjudicated. Western MWD reports on the conditions of the Arlington Basin in addition to other groundwater basins in the Santa Ana River Watershed within its service area. Basin pumping activities are not formally regulated. The Arlington Basin is part of the Santa Ana River Watershed and falls under the jurisdiction of the Santa Ana Watershed Project Authority (SAWPA). **Table 14-2** provides a list of governing agencies in the Arlington Basin and their respective roles.

Interactions with Adjoining Basins

A groundwater divide in the alluvium separates the Arlington Basin from the Riverside Basin to the north (DWR, 2004). In the southwest, groundwater exits the Arlington Basin into the Temescal Basin as underflow through a bedrock gap. These boundaries are not barriers to flow. There are no agreements that govern these flows.

WATER SUPPLY FACILITIES AND OPERATIONS

The following provides a summary of the facilities within the Arlington Basin.

Table 14-2
Summary of Management Agencies in the Arlington Basin

Agency	Role
Western Municipal Water District	Reports on water extraction for Arlington Basin and operates Arlington Desalter.
Santa Ana Water Project Authority (SAWPA)	Joint Powers Authority established to plan and build facilities to protect the water quality of the Santa Ana River Watershed.
California Regional Water Quality Control Board – Santa Ana Region (Regional Board)	Issuance of permits for discharges within the Santa Ana River Watershed.

Active Production Wells

There are currently 12 active production wells in the Arlington Basin. **Table 14-3** summarizes data related to active production wells in the Arlington Basin since 1990 when the Arlington Desalter came online. Since 1990, nearly 95 percent of the production within the Arlington Basin feeds the Arlington Desalter discussed below. **Figure 14-3** summarizes the historical production data in the Arlington Basin. Basin production has increased from an average of about 1,500 AFY between 1985 and 1989 to nearly 9,500 AFY between 2000 and 2004. This increase is due to the operation of the Arlington Desalter.

Table 14-3
Summary of Production Wells in the Arlington Basin

Category	Number of Active Wells ¹	Estimated Production Capacity ² (AFY)	Average Production 1990-2004 (AFY)	Well Operation Cost (\$/AF)
Desalter Wells	5	9,220	5,214	Not available
Other Wells	7	7,071	1,325	
Total	12	16,291	6,539	

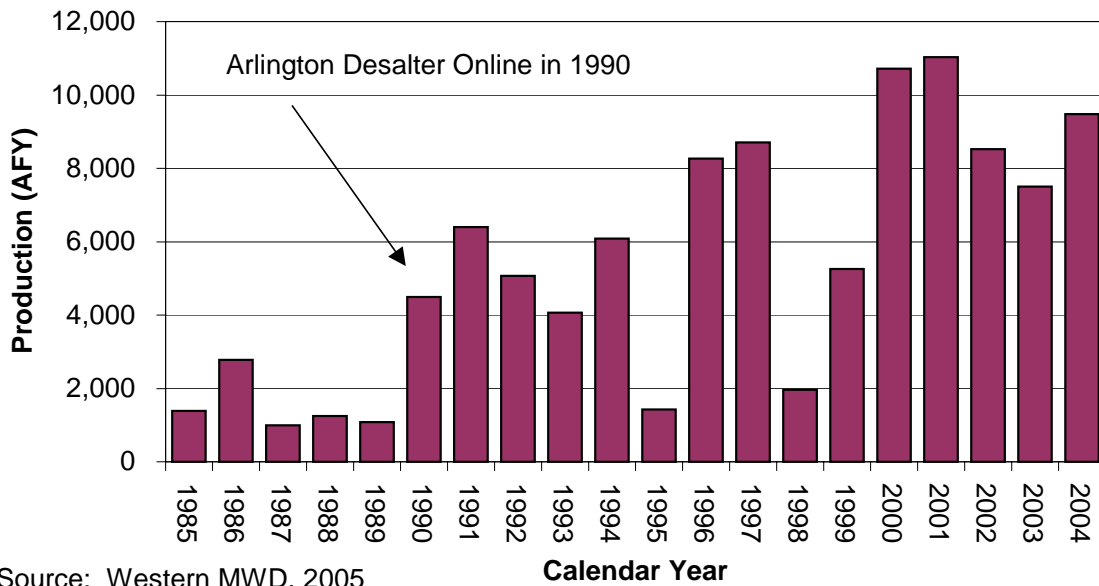
Source: Western MWD, 2005 and Wildermuth, 2006

- Active wells have production within past 5 years
- Estimated production capacity is based upon maximum annual production in past 5 years. Estimated capacity from other wells determined by Wildermuth, 2006.

Other Production

Prior to 1997, surface diversions from the Harrison Wash by the City of Riverside were a source of additional production with an average of about 250 AFY. This source has been inactive since 1997.

**Figure 14-3
Historical Groundwater Production in the Arlington Basin**



Source: Western MWD, 2005

ASR Wells

There are no ASR wells in the Arlington Basin.

Spreading Basins

There are no spreading basins in the Arlington Basin.

Seawater Intrusion Barriers

There are no seawater intrusion barriers in the Arlington Basin.

Desalters

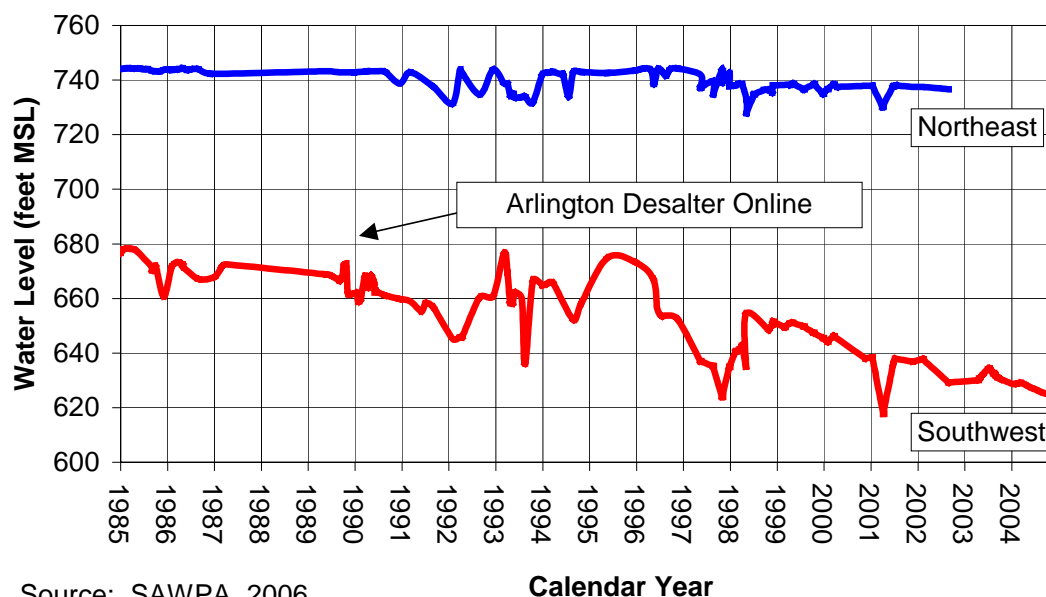
The existing Arlington Desalter facility, operating since 1990, extracts and treats impaired groundwater from the Arlington basin in the southwestern area of the City of Riverside. The desalter, using Reverse Osmosis (RO) technology, produces up to six (6) million gallons per day (MGD) of blended desalinated water, with another estimated one (1) MGD of concentrated brine (high salinity water) generated by the plant discharged to the Santa Ana Regional Interceptor

(SARI) line, which is treated by Orange County Sanitation District and used for recharge by Orange County Water District (SAWPA, 2006a). The desalter was managed and operated by SAWPA until 2005. At that time, the desalter assets and operations were transferred to Western MWD. Water from the Arlington Desalter is supplied to the City of Norco to meet municipal demand.

GROUNDWATER LEVELS

Groundwater flow is generally toward the north and west in the northern portion of the basin and southwest toward the Temescal Basin in the southern portion (DWR, 2004). In general, water levels in the Arlington Basin are relatively shallow with depths to water ranging from 10 to 60 feet below ground surface. Water level data from select inactive production wells in the basin are shown in **Figure 14-4**. In the northeastern part of the basin, water levels were relatively stable between 1985 and 2004. Water levels have declined about 50 feet in the southwest portion of the Arlington Basin during this same period. This decline is likely due to this well's proximity to the Arlington Desalter.

Figure 14-4
Historical Water Levels in the Arlington Basin



GROUNDWATER QUALITY

The following provides a brief description of the current water quality of the Arlington Basin. It includes a discussion of current groundwater monitoring activities, contaminants of concern and treatment processes for the region.

Groundwater Quality Monitoring

Groundwater quality samples are collected from active production wells in accordance with California DHS requirements as specified in Title 22 of the California Code of Regulations.

The Santa Ana Watershed Basin Monitoring Task Force is a collaborative effort of public and private sector agencies and interests. As part of this effort, SAWPA compiles water quality data in the Santa Ana River Watershed, including total dissolved solids (TDS) and nitrate (as N) data. SAWPA also prepares a triennial update of the ambient groundwater quality throughout all the groundwater basins in the Santa Ana River Watershed.

Groundwater Contaminants

Contaminants of concern for the Arlington Basin from active production wells are summarized in **Table 14-4**. Inorganic constituents of concern for the Arlington Basin are TDS and nitrate. The native groundwater is currently non-potable with historical ambient levels of TDS and nitrate (as N) of 983 mg/L and 25.5 mg/L, respectively (Wildermuth, 2005). Average TDS concentrations of the active production wells from which data were available ranged from 964 to 1,400 mg/L with an average of 1,118 mg/L between 1994 and 2004. Average nitrate concentrations (as nitrogen) ranged from 13.6 to 22.7 mg/L with an average of 18.3 mg/L during the same period. (SAWPA, 2006b)

Trichloroethylene (TCE) and tetrachloroethylene (PCE) have been detected in various wells in the Arlington Basin. Concentrations of TCE have ranged from non-detect (ND) to 29 µg/L. Concentrations of PCE have ranged from ND to 0.7 µg/L, which is below the MCL of 5 µg/L for PCE. These wells are currently treated by the Arlington Desalter.

In addition, perchlorate and dibromochloropropane (DBCP) have also been detected in produced groundwater from five wells in the Arlington Basin. Concentrations of perchlorate ranged from 2 µg/L to 7.3 µg/L with an average of 5.6 µg/L between 1994 and 2004 (SAWPA, 2006b). Some of these concentrations are above the notification level of 6 µg/L. DBCP has also been detected in produced groundwater from the Arlington Basin. Concentrations have ranged from non-detect to 0.07 µg/L between 1994 and 2004 (SAWPA, 2006b). The MCL for DBCP is 0.2 µg/L. These wells are currently treated by the Arlington Desalter.

Blending Needs

Because the water quality of the Arlington Basin does not currently meet drinking water standards for TDS and nitrate, water is treated by the Arlington Desalter and/or blended to meet municipal demand.

Groundwater Treatment

As discussed above, the Arlington Desalter treats up to 6 MGD (6,400 AFY) of groundwater from the Arlington Basin.

Table 14-4
Summary of Constituents of Concern in the Arlington Basin

Constituent	Units	Range	Description
TDS Secondary MCL = 500	mg/L	964 to 1,400 Average: 1,118	Historical ambient concentration of 983 mg/L. Wells are treated by Arlington Desalter.
Nitrate (as N) Primary MCL = 10	mg/L	13.6 to 22.7 Average 18.3	Historical ambient concentration of 25.5 mg/L. Wells are treated by Arlington Desalter.
VOCs (TCE and PCE) Primary MCL: TCE = 5 PCE = 5	µg/L	ND to 29 for TCE ND to 0.7 for PCE	One well has been impacted by TCE with maximum concentrations above MCL of 5 µg/L. Three wells have been impacted by PCE with concentrations below MCL.
Perchlorate Notification Level =6	µg/L	2 to 7.3 Average: 5.6	Five wells within the Arlington Basin are known to have been impacted by perchlorate. Four wells have had concentrations above the current action level of 6 µg/L.
DBCP Primary MCL = 0.2	µg/L	ND to 0.07	Five wells within the Arlington Basin are known to have been impacted by DBCP.

Source: Wildermuth, 2005, SAWPA, 2006 and Regional Board, 2006

CURRENT GROUNDWATER STORAGE PROGRAMS

There are no current groundwater storage programs in the Arlington Basin.

BASIN MANAGEMENT CONSIDERATIONS

The ambient water quality of the Arlington Basin is poor, particularly with respect to nitrate and TDS, which limit its potential for storage and extraction. However, the Arlington Desalter does increase the ability to use the basin in the future. The current treatment capacity of 6,400 AFY could limit the ability to participate in a large-scale conjunctive use program.

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