

CHAPTER 3 WATER SUPPLIES

Both local and imported water supplies are used by the CDA retail water agencies. Local sources include groundwater, surface water, recycled water and recovered groundwater treated by the CDA Desalters. Imported State Water Project (SWP) water is available to these areas through wholesale distribution to local retail agencies within IEUA's and WMWD's service area. The source of MWD's imported water used in the Chino Basin is the State Water Project. This source is used because of the Regional Board's water quality restrictions that prohibit the use of Colorado River water in the Chino Basin.

3.1 CHINO GROUNDWATER BASIN

The Chino 1 and 2 Desalters exclusively use groundwater from the southern portion of the Chino Basin. The Chino Basin is the largest groundwater basin in the Upper Santa Ana Watershed. It currently contains approximately 5,000,000 AF of water in storage, with an additional unused storage capacity (based upon historic water levels in the basin) of approximately 1,000,000 AF. About 145,000 acre-feet per year (AFY) is pumped for municipal and industrial purposes. In addition, 300 to 400 agricultural users pump about 40,000 AFY from the Chino Basin. Accordingly, total groundwater production from the Chino Basin is currently 180,000 AFY.

In June 2000, the Optimum Basin Management Program (OBMP) was adopted by the Chino Basin Watermaster (CBWM) and approved by the member agencies to address water quality problems within the Basin and to increase and improve the water supply available from this source. A more thorough discussion of management of the Chino Basin is contained in Chapter 6 and in the Chino Basin OBMP¹. The OBMP identifies groundwater recovery in the southern portion of the basin as a way to improve basin water supplies.

3.2 AVAILABLE GROUNDWATER SUPPLY

Water rights within the Chino Basin have been adjudicated (1978 Judgment).² The safe-yield of the Basin is approximately 145,000 AFY. The safe yield is allocated among three pools as follows: (1) Overlying Agricultural Pool: 82,800 AFY; (2) Overlying Non-Agricultural Pool: 7,366 AFY; and (3) Appropriative Pool: 49,834 AFY.

¹ Chino Basin Optimum Basin Management Program, August 19, 1999

² Judgment – Case No. 164327, January 30, 1978, Chino Basin Municipal Water District vs. City of Chino, et.al.

Production in excess of the safe yield from the groundwater basin must be replaced with replenishment water. In addition to local sources of recycled water and storm water, imported water is purchased from IEUA by the Chino Basin Watermaster (CBWM) to replenish the Chino Groundwater Basin. It is projected that ultimately half of the production water from the Chino Desalters extracted by the Desalter wells will come from new induced recharge from the Santa Ana River to the Basin. The induced recharge to the Chino Basin from the Santa Ana River will be the result of the hydraulic control program.³

3.3 GROUNDWATER QUALITY IN THE LOWER CHINO BASIN⁴

Groundwater in the lower Chino Basin historically has exceeded State Title 22 mandated objectives for total dissolved solids (salinity or salt) and nitrogen (nitrate). The primary purpose of the CDA facilities is to recover this groundwater and treat it with advanced water treatment process to produce potable water.

Total Dissolved Solids (TDS)

In the California Code of Regulations, Title 22, TDS is regulated as a secondary contaminant. The recommended drinking water maximum contaminant level (MCL) for TDS is 500 mg/L; however, the upper limit is 1,000 mg/L. TDS concentrations in the lower Chino Basin generally exceed 500 mg/L as discussed in Chapter 9.

Nitrates

Nitrate is regulated in drinking water by Title 22 with a maximum contaminant level (MCL) of 10 mg/L (as nitrogen). By convention, all nitrate values are reported as nitrate-nitrogen (NO₃-N) in this document. Hence, the values of nitrate-nitrogen reported in this document should be compared with an MCL of 10 mg/L.

In the Chino Basin, areas south of the 60 Freeway have somewhat elevated nitrate concentrations. In particular, areas east of the Puente and Chino Hills, south of the Jurupa Hills, along the Santa Ana River, and downgradient from the former RP-1 discharge point have elevated nitrate concentrations. Nitrate concentrations in the southern part of the basin typically exceed the 10 mg/L MCL and frequently exceed 20 mg/L.

³ Chino Basin Optimum Basin Management Program, State of the Basin Report 2004 (July 2005)

⁴ Chino Basin Optimum Basin Management Program, State of the Basin Report 2004 (July 2005)

Volatile Organic Chemicals (VOCs)

Volatile organic chemicals (VOCs) are among other constituents of potential concern in the groundwater of the Chino Basin. The following five VOCs were detected at or above their MCL in more than 10 wells:

1,1-dichloroethene;
1,2,3-trichloropropane;
Cis-1,2-dichloroethene;
Tetrachloroethene (PCE); and
Trichloroethene (TCE)

Tetrachloroethene (PCE) and Trichloroethene (TCE)

PCE and TCE were/are widely used industrial solvents; PCE is commonly used in the dry-cleaning industry. TCE is commonly used for degreasing metals. Both chemicals are found in the Milliken Landfill, south and west of the Ontario Airport and along the margins of the City of Chino Hills. These chemicals have also been found in wells around the Stringfellow plume.

Dichloroethene, and cis-1,2-dichloroethene

Dichloroethene, and cis-1,2-dichloroethene are degradation by-products of PCE and TCE (Dragun, 1988) formed by the reductive dehalogenation. In the majority of wells of the Chino Basin, Dichloroethene and cis-1,2-dichloroethene are not found. Dichloroethene is found in groundwater near the Milliken Landfill, south and west of the Ontario Airport, and at the head of the Stringfellow plume.

1,2,3-Trichloropropane

1,2,3-Trichloropropane (1,2,3,-TCP) is a colorless liquid that is used primarily as a chemical intermediate in the production of polysulfone liquid polymers and dichloropropene, synthesis of hexafluoropropylene, and as a cross linking agent in the synthesis of polysulfides. 1,2,3-TCP is found in the Chino Airport VOC plume. In addition, there is a cluster of wells that have 1,2,3-TCP in concentrations greater than the DHS "Notification Level" north of the Chino Airport and a scattering of wells exceed the Notification Level on the western margins of the basin.

3.4 CHINO BASIN DESALTER AUTHORITY FACILITIES & OPERATION

The Chino Basin Desalter Project is a win/win/win situation by; 1) providing a new local source of potable water, 2) improving the quality of groundwater by removing salt and nitrate, and 3) reducing contamination of the Santa Ana River. The projected ultimate development of the Chino Basin Desalter Program will produce 52,000 AFY of potable water; and extract an estimated 54,000 tons of salt from the Chino Basin aquifers annually. It will also stop migration of

groundwater out of Chino Basin into the Santa Ana River. As a result, the program will clean up the area's groundwater and protect surface water while helping to meet the increased potable water demands in the lower Chino Basin.⁵

Table 3-1 lists the respective phases of the Chino Basin Desalter Program and presents the planned production volume. The Chino 1 Desalter was originally built in 2000 and was recently expanded (2005). The Chino 2 Desalter was recently constructed and operation will commence in 2006. The values shown in Table 3-1 represent nominal treatment system production values.

Table 3-1 Chino Basin Desalters Projected Production of Product Water (AFY)

Desalter	Year Constructed	2000	2005	2010	2015	2020	2025
Chino 1	2000	9,000	15,900	15,900	15,900	15,900	15,900
Chino 2	2005		11,200 ¹	20,000	20,000	20,000	20,000
Chino 3	2010 – 2015		0	0	10,000	12,900	15,900
Total AFY		9,000	27,100	35,900	45,900	48,800	51,800

¹ Chino 2 Desalter begins operation in 2006
 CDA's application for a permit to increase pumping and treatment to 15 MGD (approximately 16,800 AFY) is pending.

Initial Implementation

SAWPA served as the initial contracting entity for the construction of the Chino 1 Desalter and drilled the initial eleven extraction wells. When the Chino Desalter Authority (CDA) was first organized, September 25, 2001, the CDA contracted with IEUA to take over the operation of the facility. IEUA currently operates the Chino 1 Desalter; while JCSD operates and maintains the groundwater extraction wells.

Chino 1 Desalter – Current Operations

The Chino 1 Desalter, located at 6905 Kimball Avenue in Chino, California, was the beginning component of the innovative Chino Basin Desalination Program. When the Chino 1 Desalter was commissioned and began operations in the summer of 2000, it had a capacity of 9,000 AFY. The initial 11 extraction wells delivered brackish water to the Chino 1 Desalter. The reverse osmosis (RO) system treats 76% of the well production, which is then blended with low TDS groundwater producing 9,000 AFY of potable water that is then delivered to the cities of Chino and Chino Hills and Jurupa Community Services District (JCSD). Concentrated brine from the RO process is discharged to the Santa Ana River Interceptor (SARI) line as non-reclaimable water (NRW) and is conveyed to the Orange County Sanitation District (OCSD) for treatment and ultimate disposal in

⁵ Chino Basin Optimum Basin Management Program, State of the Basin Report 2004 (July 2005)

the Pacific Ocean. Brine disposal exports approximately 10,000 tons per year of salt from the Chino Basin. The Chino 1 Desalter was expanded in 2005.

The initial treatment processes employed at the Chino 1 Desalter were:

1. Pretreatment
2. Filtration
3. Reverse osmosis
4. Disinfection
5. Disposal of concentrated brine, and
6. Blending of product water, followed by
7. Distribution

Actual historical production of groundwater treated at the Chino 1 Desalter is tabulated in Table 3-2, between the years 2001 and 2005.

Table 3-2 Historic Production from Chino 1 Desalter, AFY

Agency	Contract Value AFY	2001 ¹	2002	2003	2004	2005 YTD ²
City of Chino	5,000	1,450	3,476	2,853	2,697	2,164
City of Chino Hills	4,200	746	2,318	1,855	1,353	1,116
City of Ontario	5,000	0	0	0	0	0
Subtotal IEUA	14,200	2,196	5,794	4,708	4,050	3,280
Jurupa CSD	8,200	1,292	4,422	3,833	4,515	3,007
SARWC	1,200	0	0	0	0	0
City of Norco	1,000	0	0	0	0	0
Subtotal WMWD	10,400	1,292	4,422	3,833	4,515	3,007
Totals AFY	24,600	3,488	10,216	8,541	8,565	6,287

1. Desalter production 7/1/01 through 12/31/01

2. Desalter production 1/1/05 through 9/20/05

Chino I Expansion

An increased demand in contracted water deliveries to the City of Chino Hills, the City of Chino, and the City of Ontario necessitated the expansion of the Chino I Desalter. It was determined an Ion Exchange Treatment System and Volatile Organics (VOCs) Stripping Towers should be added to increase the Chino I Desalter's product water flow from 9,000 AFY to 15,900 AFY.

As mentioned previously, the initial treatment process included blending of low TDS well water (bypass wells) with the RO treated well water that reduced the high nitrates (40 mg/L as N) and TDS (1,080 mg/L) to acceptable potable water levels. In April 2005, the facility added stripping towers to treat the water from the low TDS wells for removal of volatile organics (VOCs). The Ion Exchange System came online in July 2005 bringing the total facility capacity to 15,900 AFY.

Chino 1 Desalter Extraction Wells

Table 3-3 lists the original 11 wells that are operated to deliver water to the Chino 1 Desalter. Table 3-4 lists the three wells drilled for the Chino 1 Expansion; (also see Figure 3-1 for locations of the respective wells).

In addition to the extraction wells, there are monitoring wells, raw water pipelines, reservoirs, product water pipelines, pump stations, brine disposal lines and other offsite facilities that make up the Chino 1 and 2 Desalter systems.

Table 3-3 Chino 1 Desalter Extraction Wells (2001)

Well No.	Location of Well	Horsepower	Flow Capacity		
			GPM	MGD	AFY
I-1	15000 Euclid Avenue, Chino CA	75	600	0.86	964
I-2	15200 Euclid Avenue, Chino CA	40	300	0.43	482
I-3	15300 Euclid Avenue, Chino CA	75	600	0.86	964
I-4	7600 Kimball Avenue, Chino CA	40	600	0.86	964
I-5	8500 Kimball Avenue, Chino CA	125	1,200	1.72	1,927
I-6	8600 Kimball Avenue, Chino CA	125	1,200	1.72	1,927
I-7	8650 Kimball Avenue, Chino CA	125	1,200	1.72	1,927
I-8	15250 Walker Avenue, Riverside Co.	100	900	1.29	1,446
I-9	8700 Remington Street, Riverside Co	100	1,200	1.72	1,927
I-10	8800 Remington Street, Riverside Co	100	1,200	1.72	1,927
I-11	9300 Remington Street, Riverside Co	125	1,200	1.72	1,927

Table 3-4 CDA Chino 1 Expansion Extraction Wells (2005)*

Well No.	Location of Well	Horsepower	Flow Capacity		
			GPM	MGD	AFY
I-13	14156 Bay Circle, Riverside Co.	250	2,200	3.2	3,600
I-14	13844 Blue Ribbon Lane, Riverside Co.	250	2,000	2.9	3,250
I-15	6577 Cedar Creek Road	250	2,000	2.9	3,250

*Well No. 1-12 was drilled but never developed due to poor production characteristics.

Chino 2 Desalter

The Chino 2 Desalter was initiated by the CDA to provide 11,200 AFY of water deliveries to JCSD, the City of Ontario, the City of Norco and the Santa Ana River Water Company. The Chino 2 Desalter is located at the JCSD Headquarters at 11202 Harrel Street in Mira Loma, California. The Desalter was

recently constructed and will began operation in 2006. Groundwater from the eight wells in the Mira Loma area will be treated using a Reverse Osmosis system and an Ion Exchange treatment system. This Desalter will have a treatment capacity to produce 11,200 AFY of potable water. The water will be pumped to, and commingled in the Desalter distribution system for delivery to the municipal water supply systems of the CDA entities (Figure 3-2). An expansion to Chino 2 Desalter is likely to be completed by the year 2010. The expansion would increase the Chino 2 Desalter capacity to 20,000 AFY.

The eight Chino 2 Desalter wells are described in Table 3-5 and their locations are shown on Figure 3-1.

Table 3-5 Chino 2 Desalter Extraction Wells

Well No. ¹	Location of Well In Mira Loma, CA	Horsepower	Flow Capacity		
			Design Rate GPM	MGD	AFY
II-1	5815 Summer Avenue	300	2,000	2.9	3,250
II-2	3955 Bellegrave Avenue	300	2,000	2.9	3,250
II-3	4155 Bellegrave Avenue	300	2,000	2.9	3,250
II-4	5240 Hamner Avenue	300	2,000	2.9	3,250
II-6	12080 Bellegrave Avenue	300	2,000	2.9	3,250
II-7	5339 Wineville Avenue	250	1,500	2.2	2,465
II-8	5559 Wineville Avenue	200	1,500	2.2	2,465
II-9a	11766 Bellegrave Avenue	300	2,000	2.9	3,250

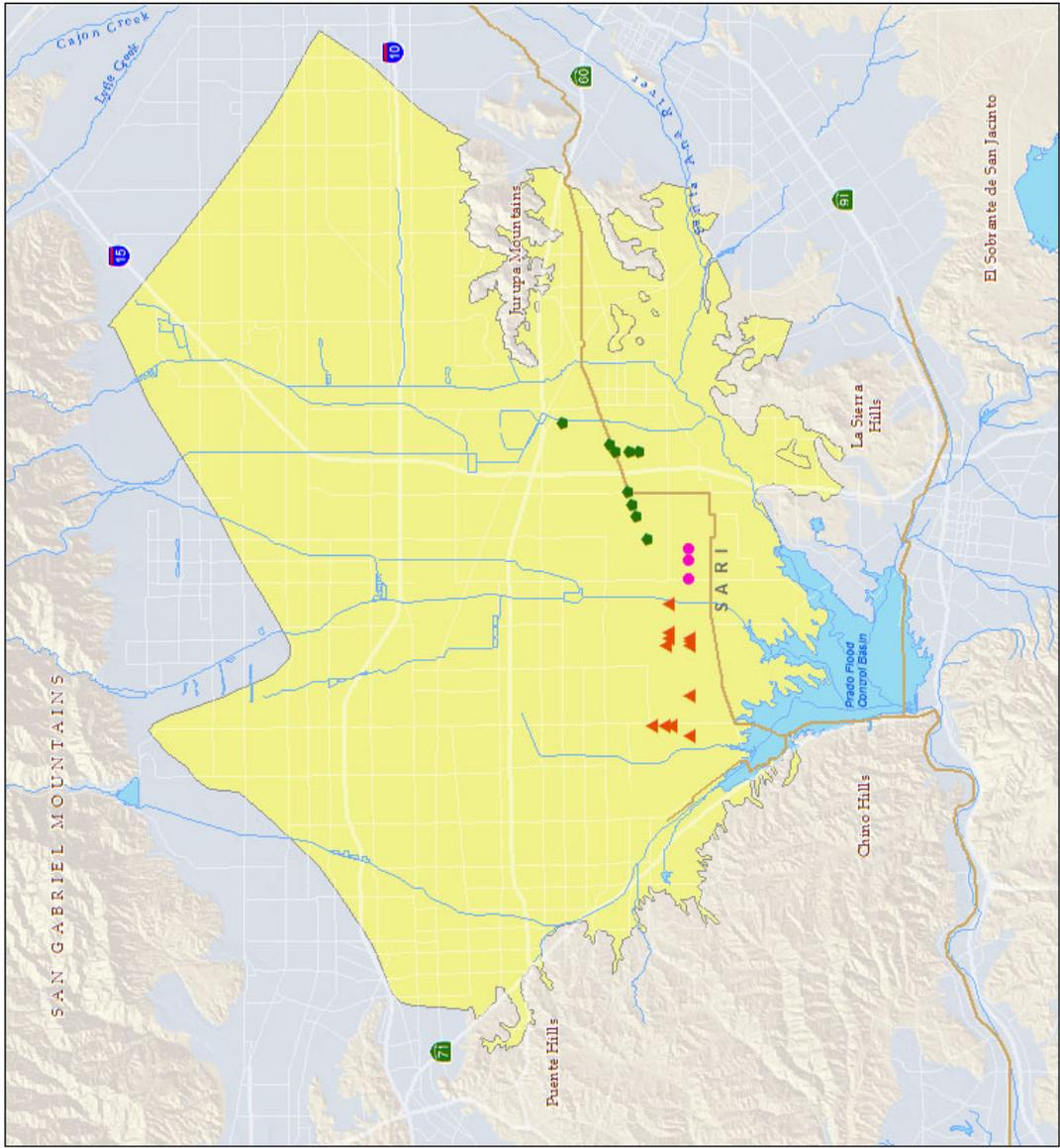
¹ Well No. II-5 and Well No. II-9 were drilled but never developed due to poor production characteristics.

Pursuant to design and construction of the Chino I Expansion and Chino II Desalter Projects, Tom Dodson & Associates and RBF Consulting prepared the Chino I Expansion and Chino II Desalter Project Environmental Impact Report in November 2001.⁶ The document was adopted in its final form with comments, January 25, 2002, by the CDA.

⁶ Chino I Desalter Expansion and Chino II Desalter Project EIR, November 2001, TDA & RBF Consulting.

Existing CDA Extraction Wells
Figure 3-1

- Legend**
- ▲ Desalter Well
 - Desalter Expansion Well
 - Desalter Well
 - Stream
 - SARI Line
 - Water Body
 - Chino Basin Hydrologic Boundary
 - Quaternary Alluvium



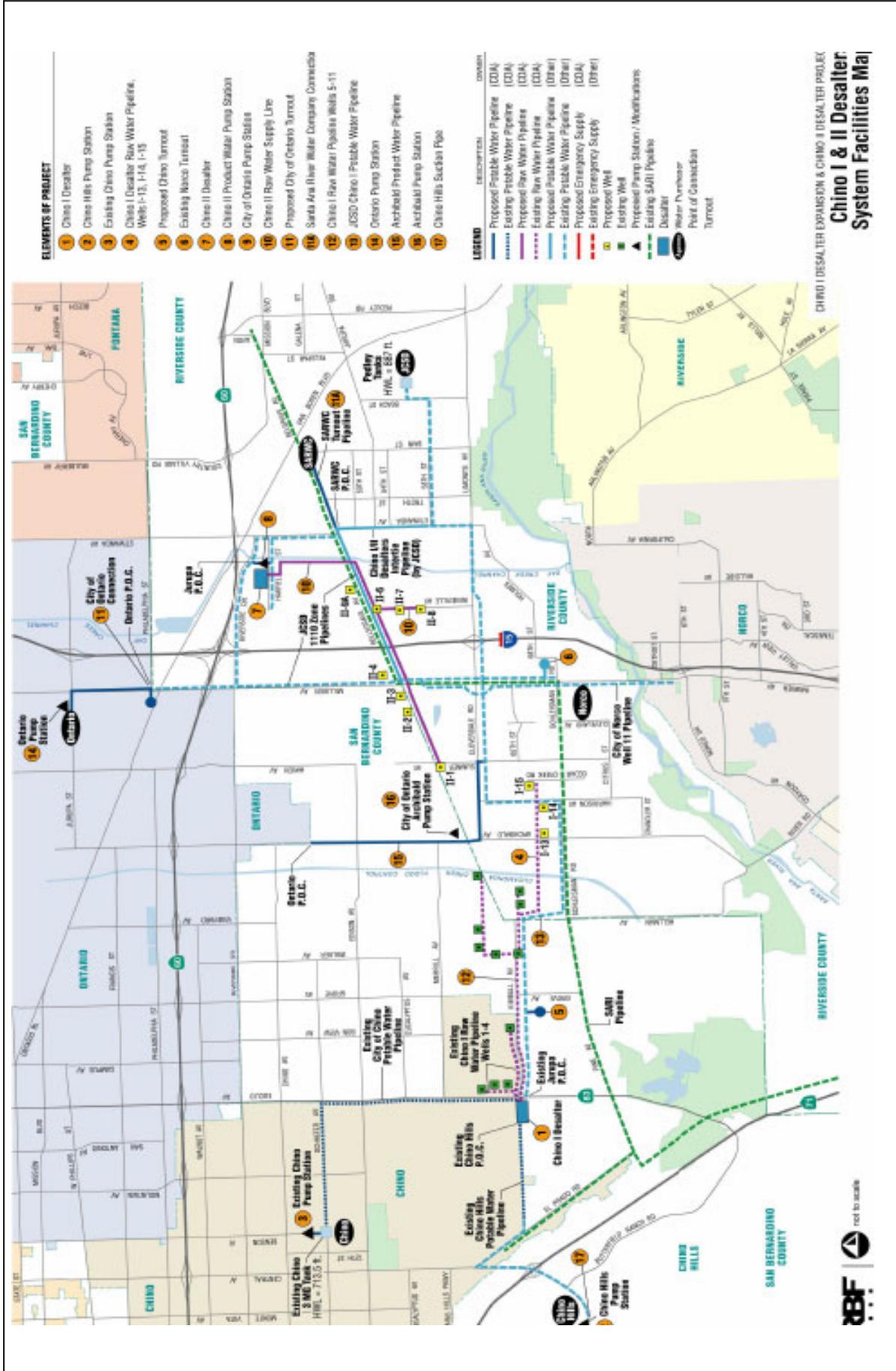


Figure 3-2