City of San José

San José/Santa Clara Water Pollution Control Plant Master Plan

TASK NO. 3
PROJECT MEMORANDUM NO. 7
SUMMARY OF HISTORICAL AND PROJECTED WATER REUSE DEMANDS

FINAL DRAFT
February 2009

2700 YGNACIO VALLEY ROAD • SUITE 300 • WALNUT CREEK, CALIFORNIA 94598 • (925) 932-1710 • FAX (925) 930-0208

CITY OF SAN JOSÉ

SAN JOSÉ/SANTA CLARA WATER POLLUTION CONTROL PLANT MASTER PLAN

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SUMMARY OF HISTORICAL AND PROJECTED WATER REUSE DEMANDS

1.0 INTRODUCTION

The South Bay Water Recycling (SBWR) program provides tertiary treated wastewater from the San José/Santa Clara Water Pollution Control Plant (WPCP) to recycled water retailers who then provide recycled water to irrigation, industrial and other customers in Santa Clara County. The recycled water produced as part of the SBWR program serves numerous environmental purposes and assists the WPCP in meeting its National Pollutant Discharge Elimination System (NPDES) discharge regulations.

The WPCP has a dry weather effluent flow trigger of 120 million gallons per day (mgd) average dry weather effluent flow (ADWEF). The SBWR program helps the WPCP stay below this trigger by redirecting some of the flow for beneficial reuse. In addition, the SBWR program assists the WPCP in meeting its existing regulatory requirements by minimizing effluent loading. In the future, as the flows to the WPCP facility increase, the SBWR program will play an increasingly significant role in assisting the WPCP to stay below its flow trigger and meet future regulatory limits. Additionally, the water recycling program helps the City meets its sustainability goals and green vision.

This project memorandum (PM) evaluates the historical water reuse system and examines the projected growth of the SBWR program.

2.0 BACKGROUND

The SBWR program began under the auspices of the WPCP's NPDES permit in 1998. The program was developed to protect the salt marsh habitat of two federally protected endangered species, the salt marsh harvest mouse, and the California clapper rail, by reducing effluent flows from the WPCP into the wetlands of the South San Francisco Bay. A further benefit of this program was the development of a drought-proof supply of water, which augments local and imported water supplies.

The SBWR wholesales recycled water to various retailers, who then distribute it to the end users (customers). These customers use the recycled water for non-potable purposes such as agriculture, industrial cooling and processing, and irrigation of golf courses, parks, and schools. The disinfected tertiary treated wastewater is delivered through an extensive recycled water distribution system consisting of over 105 miles of pipeline. During the peak summer season, between 10 to 18 million gallons (MG) of recycled water is delivered per day for irrigation and industrial uses throughout San José, Santa Clara, and Milpitas, preserving valuable drinking water for future generations.

3.0 HISTORICAL WATER REUSE SYSTEM

The SBWR program serves as the primary provider of recycled water in Santa Clara County. Starting in 1998, the program has provided recycled water to irrigation, industrial, and other customers, including onsite use at the WPCP. The SBWR program was started in 1996 with delivery to 25 customers. Since its inception in 1996, the customer base has grown to over 550 largely due to actions such as subsidized recycled water costs, customer retrofit incentives, and regional planning programs implemented by the SBWR program.

3.1 Recycled Water Retailers

The SBWR program actively participated in the Bay Area Regional Water Recycling Program (BARWRP) in the early 1990s. SBWR continues to be actively involved with the Bay Area Clean Water Association (BACWA). SBWR supplies water to users through several area retailers. These retailers include:

- San José Municipal Water.
- San José Water Company.
- City of Milpitas Water, Sewer and Storm Drain.
- City of Santa Clara Water and Sewer Utility.
- Great Oaks Water Company.

The existing customer service area and the retailer for each service area is presented in Figure 1.

3.2 Existing Uses and Demands

Typical uses of recycled water include landscape irrigation, median and streetscape irrigation, agriculture, cooling towers, paper manufacturing, power generation, and dual plumbing water closet use. The recycled water produced by the WPCP meets disinfected tertiary treatment levels and unrestricted use as outlined in Title 22. The two general types of recycled water uses within the service area are irrigation/agricultural and industrial, with irrigation/agricultural use accounting for the largest recycled water demand. In addition, recycled water is used onsite at the WPCP as WPCP process water, for irrigation, and as a sludge lagoon cap. Onsite WPCP recycled water use is not monitored separately.

As seen in Table 1, since the inception of the recycled water system in 1996, the total number of end user/customer accounts and recycled water deliveries has increased steadily.

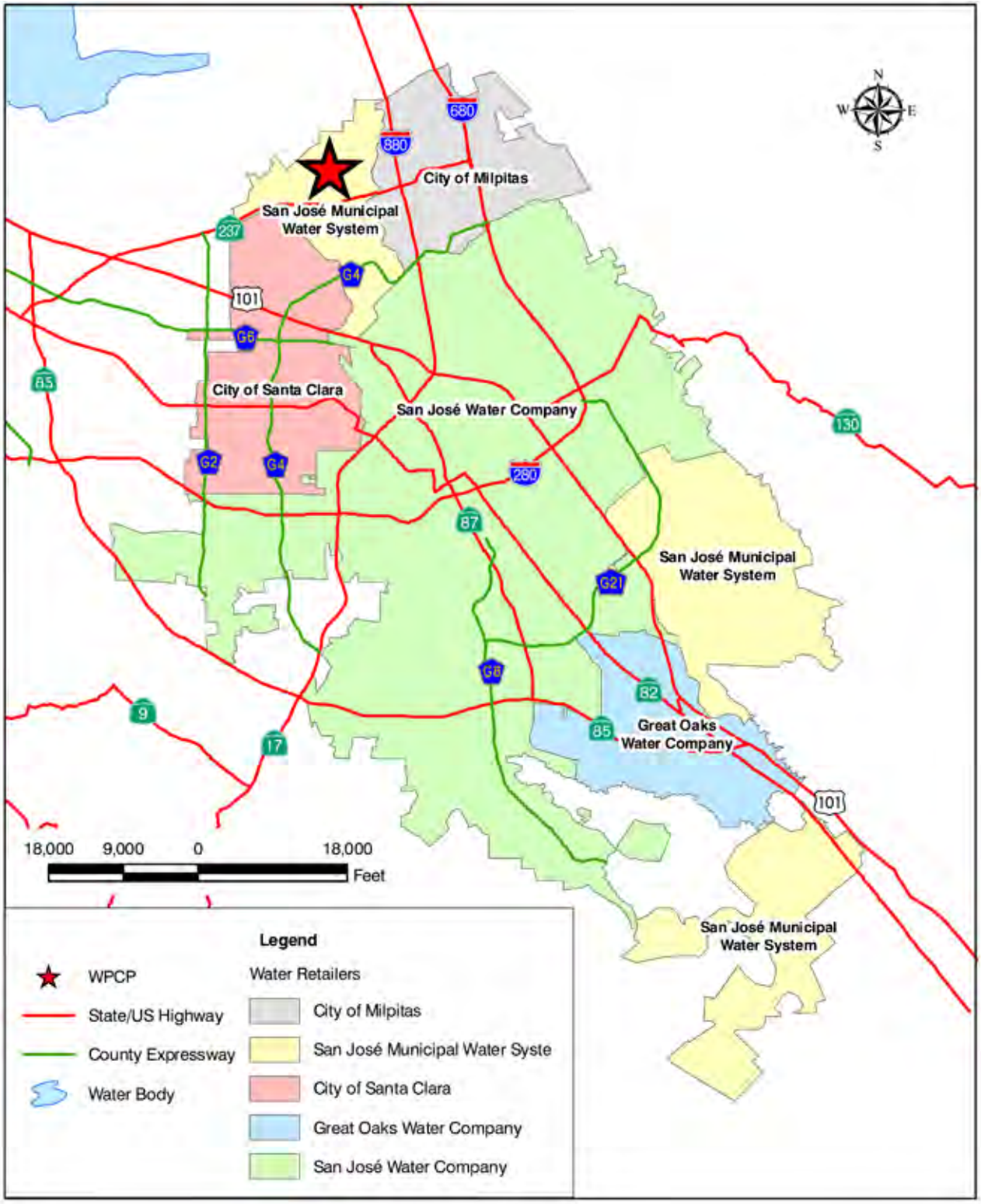

Figure 1
EXISTING RECYCLED WATER SERVICE AREA
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

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Monday, July 14, 2008

Table 1	Historic Recycled Water Accounts and Usage San José/Santa Clara Water Pollution Control Plant Master Plan City of San José	
Year	**Total Number of Customers[(1)]**	**Total Delivered Volume (mgd)[(2)]**
1997	25	NA
1998	98	3.4
1999	156	4.5
2000	245	5.9
2001	298	6.4
2002	340	8.1
2003	359	8.5
2004	409	9.5
2005	508	9.5
2006	530	9.7
2007	542	11.0

Notes:

NA = Not Available.

(1) SBWR reported a 2008 customer base of 556.

(2) Complete consumption data for 1997 and 1998 unavailable. Recycled water delivery from 1998 to 2007 is based on Transmission Pump Station (TPS) meter readings. This data includes some onsite WPCP consumption.

A notable exception to the steady increase occurred in late 2004/early 2005, when two new power plants came online as recycled water users, increasing the recycled water deliveries by approximately 2 mgd. Table 1 also summarizes the annual recycled water delivery.

Total recycled water volume delivered was obtained from City of San José (City) provided Transmission Pump Station (TPS) data for the years 1998 through 2007. The City provided recycled water deliveries by City and customer category for the years between 2000 and 2006, and the SBWR program provided invoice information for the City of Milpitas, City of Santa Clara, San José Municipal Water, and San José Water Company from 1998 to 2007. In addition, the SBWR program provided delivery data by customer and category for the years 2006 and 2007.

In order to estimate total recycled water delivered as well as volume delivered by customer category, several data sources were used. The TPS meter readings from 1998 through 2007 were used to estimate total recycled water delivered. This reading includes some onsite WPCP use. The City provided information on volume delivered by customer category was used to determine irrigation/agricultural and industrial recycled water consumption between 2000 and 2006. The SBWR program delivery volume data by customer was used to determine irrigation/agricultural and industrial consumption in 2007.

Onsite/WPCP recycled water consumption was assumed to equal the difference between the total recycled water volume delivered and the irrigation/agricultural and industrial consumption. Since the TPS meter captures recycled water flows leaving the WPCP, use of recycled water as process water or for WPCP irrigation is not captured in this reading. However, some TPS metered recycled water is sent back to the WPCP for use as process and irrigation water. This portion is captured by the TPS flow meters. It is expected that there will be minor variations in delivery volume due to meter and reading error. In addition, because data from several different sources and metering points are being used, the summation of delivered volume from the different sources is not expected to be exact or equal. Estimated total volume consumed by category for the entire service area is summarized in Table 2. Figure 2 graphically presents this information.

Table 2 Historic Recycled Water Use by Category[1]
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

Year	Irrigation[2] (mgd)	Industrial[2] (mgd)	Onsite/ WPCP[3] (mgd)	Total[4] (mgd)
1997	–	–	–	–
1998	–	–	–	3.4
1999	–	–	–	4.5
2000	3.5	0.4	2.0	5.9
2001	4.5	0.4	1.5	6.4
2002	4.9	0.5	2.7	8.1
2003	5.1	0.8	2.6	8.5
2004	6.0	0.9	2.6	9.5
2005	4.6	2.3	2.6	9.5
2006	4.5	2.7	2.5	9.7
2007	5.5	2.5	3.1	11.0

Notes:

(1) Complete usage information not available for 1997 through 1999.

(2) Industrial and irrigation consumption for 2000 through 2006 provided by the City of San José. Industrial and irrigation consumption in 2007 calculated using the SBWR program invoice data.

(3) Onsite/WPCP consumption calculated by taking the difference between Total recycled water delivered and Industrial and Irrigation consumption.

(4) Total recycled water deliveries assumed to equal the flow passing through the Transmission Pump Station (TPS) meter. This volume represents consumption by all retailers and includes some WPCP use as well.

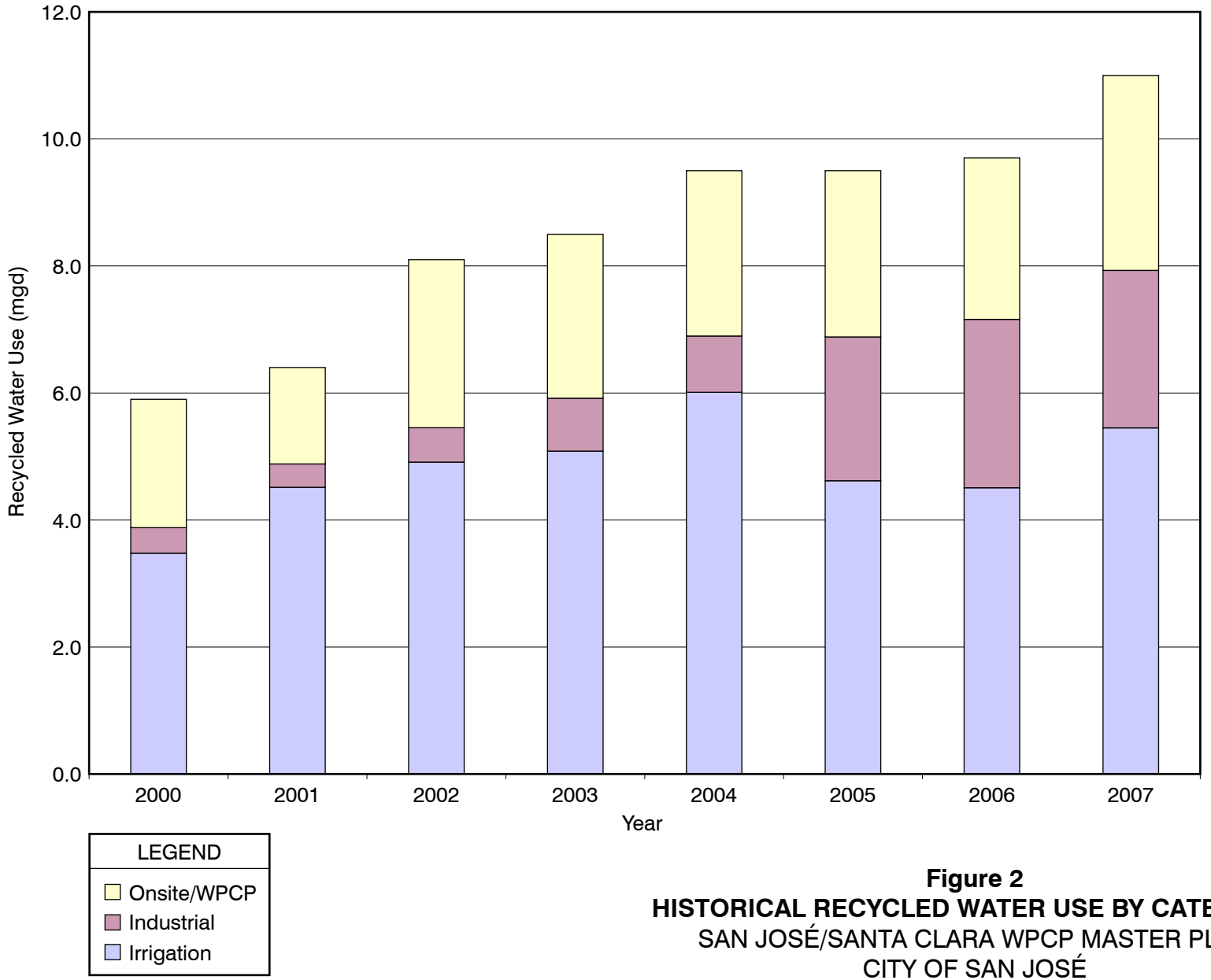

Figure 2
HISTORICAL RECYCLED WATER USE BY CATEGORY
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

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4.0 PLANNED RECYCLED WATER USE

As growth occurs in Santa Clara County, recycled water demands for the SBWR program is expected to increase. The Cities of San José, Santa Clara and Milpitas require use of recycled water for irrigation of areas greater than 10,000 square feet whenever recycled water is available. Future recycled water uses are expected to be primarily for irrigation, industrial, and WPCP demands.

4.1 Projected Recycled Water Uses and Demands

The SBWR program has targeted expansion goals to support the City of San José Green Vision and the Santa Clara Valley Water District/City of San José Joint Water Study. In order to meet the future recycled water needs of the Cities of San José, Santa Clara and Milpitas, the SBWR program is working closely with its recycled water retailers to expand the program. The role of the SBWR program in the City of San José Green Vision and Santa Clara Valley Water District's (SCVWD) recycled water goals, as well as proposed expansions and new recycled water uses, are further discussed below.

4.1.1 Green Vision and Joint Water Study

In its effort to capitalize on the innovation that already exists in the City of San José community, and lead the effort in the Clean Technology, Sustainability, and Green Mobility initiative, Mayor Chuck Reed set forth ten goals in the City of San José's Green Vision (Green Vision) or End's Policy. The Green Vision is anticipated to serve as a roadmap to solve its environmental problems. Of these ten goals, goal number six (Goal 6) is to beneficially reuse 100 percent, or approximately 100 mgd, of the City's wastewater over the next fifteen years. The complete language for Green Vision Goal 6 is provided in Appendix A. In addition, the SCVWD has set a goal of providing 10 percent of its total water use through recycled water by 2020. This shared vision between the City and SCVWD provides an enormous opportunity for expansion of current recycled water use.

The work plan to achieve this goal includes increase in water reuse through the SBWR program to 40 mgd using a combination of several expansion techniques. These include:

- Current irrigation and industrial nonpotable recycled water use of approximately 10 mgd.
- Extension of the current nonpotable recycled water distribution system to reach new customers that can use an additional 10 mgd.
- Addition of 10 mgd of nonpotable recycled water to streams to improve the riparian environment.
- Further treatment of recycled water for indirect addition into local drinking water aquifers (groundwater recharge).

Successful implementation of Goal 6 would result in a four-fold increase in recycled water use over the next fifteen years. The SBWR program plans to maximize the use of recycled water while maintaining benefits of dicharte to the San Francisco Bay habitat. Table 3 presents the total projected growth for the SBWR program until 2040.

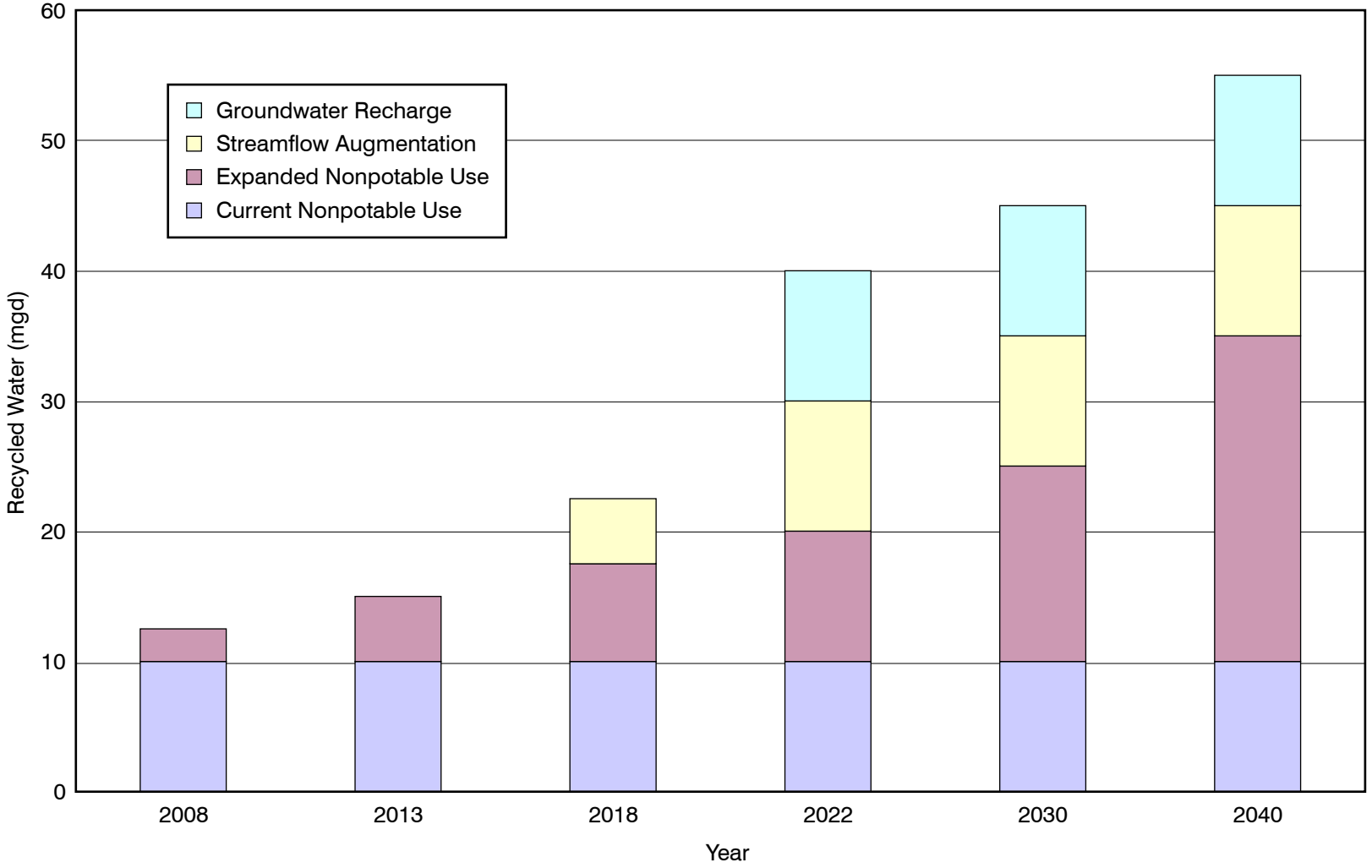
Table 3 Total Projected Recycled Water Use by Category[1]
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

Category	2008 (mgd)	2013 (mgd)	2018 (mgd)	2022 (mgd)	2030[2] (mgd)	2040[2] (mgd)
Current Nonpotable Use	10	10	10	10	10	10
Extended Nonpotable Use	2.5	5	7.5	10	15	25
Streamflow Augmentation	0	0	5	10	10	10
Groundwater Recharge	0	0	0	10	10	10
Total	12.5	15	22.5	40	45	55

Notes:
(1) All usage and growth data based on goals identified in the City of San José Green Vision and the City of San José and Santa Clara Water District Joint Water Study.
(2) The recycled water uses in 2030 and 2040 are estimated assuming expansion of the system at the same rate as the growth between 2008 and 2022. Streamflow augmentation and groundwater recharge are conservatively kept at the 2022 value.

The Green Vision identifies recycled water delivery growth until 2022. As presented in the previous section, the current nonpotable recycled water distribution system delivers approximately 10 mgd to its customers. These existing customers are expected to continue to require at least this volume of recycled water. In addition, plans are in place to add new customers through potential expansion to Alameda County and connection with the Sunnyvale recycled water system. The extension of the current nonpotable recycled water distribution system to reach new customers assumes additional use of approximately 0.7 mgd per year up to the year 2022. It was assumed that extension of the current nonpotable recycled water distribution system will continue to grow at the same rate of 0.7 mgd per year from 2022 until 2040. Due to the complexity and regulatory restrictions governing streamflow augmentation and groundwater recharge, these uses, when implemented, were assumed to remain constant at 10 mgd. Figure 3 presents the projected growth for the SBWR program.

Each of these four work plan items identified above and in Table 3 is discussed in more detail in the following sections.



NOTES:

Recycled water use in 2030 and 2040 estimated assuming constant expansion of nonpotable uses.

Figure 3
PROJECTED GROWTH FOR THE SBWR PROGRAM
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

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4.1.1.1 Expansion and Extension of Current Nonpotable Recycled Water Distribution System

The current nonpotable recycled water system provides some room for distribution system expansion by connecting properties adjacent to the current system, as well as opportunities for distribution system extension by adding new pipes to service new developments.

Currently, there are plans to connect Milpitas parks and schools to increase recycled water use by 0.1 mgd. There are also plans to increase industrial customer use of recycled water in cooling towers by approximately 3 mgd. In addition, pipeline extensions are being planned to reach new high-use customers such as Modern Ice (former General Electric complex), Equinox server farm in Santa Clara, and the Mineta/San José International Airport expansion where recycled water can be used for operation of dual plumbed systems, car washing, cooling and irrigation.

Plans are also in place to serve the North San José Intensification Project. This project includes three major areas of planned development that will require a substantial increase in the amount of recycled water delivered within the San José Municipal Water Service area. The Water Supply Assessment for the project estimates an ultimate recycled water increase of approximately 3.7 mgd within the North San José/Alviso service area. An increase is also projected for the "Evergreen East Hills Visioning Strategy," which addresses new development within the Evergreen service area. The preliminary Water Supply Assessment for this project estimates an increase of approximately 0.5 mgd. In total, over the next fifteen to twenty years, these new developments are expected to use up to 6 mgd of recycled water at an addition cost of $75 million.

The use of recycled water is required as both a water supply source in order to meet demands associated with these development projects, and as an effluent flow diversion measure to stay below the flow trigger of 120 mgd. Additional distribution facilities are expected to be funded by developers as required to expand the system to meet their water supply and the flow diversion needs. In total, the current nonpotable recycled water distribution system is expected to provide an estimated 10 mgd of use through 2040, and extension of the current system to reach new customers is expected to provide additional use of up to 25 mgd by 2040.

4.1.1.2 Increase in Stream Flow Augmentation

Currently, discharge from potable water reservoirs is used to augment stream flows. Using recycled water for stream flow augmentation will free this water for alternate uses and ensure that a streamflow supply immune to droughts or San Francisco Bay delta issues is available.

Over the next 15 years, the SCVWD had planned to implement a pilot project to add as much as 10 mgd of recycled water into to enhance the riparian environment. In the first phase of the project, SCVWD had planned to add approximately 0.4 mgd of recycled water

into Silver Creek. However, recent analyses have revealed trace amounts of perflorochemicals (PFCs), and particularly the subset perfluorooctane sulfonates (PFOS), determined to be harmful to avian species at approximately 50 nanograms per liter (ng/L), in the recycled water. Therefore, streamflow augmentation studies scheduled for the summer of 2008 have been halted until further information is available.

The SBWR program is working with the SCVWD and the City to design an advanced treatment recycled water facility using microfiltration (MF) and reverse osmosis (RO) membranes and ultraviolet (UV) disinfection as part of the indirect potable reuse project. This facility would enhance the quality of the recycled water so that it is suitable for more uses. In addition, as mentioned during the Master Plan Brainstorm Workshop, alternative sites such as at Guadalupe River and Coyote Creek should be considered as potential streamflow augmentation sites. The SBWR program staff plans to continue evaluation of the technical and economic feasibility of using recycled water for streamflow augmentation.

4.1.1.3 Advanced Treatment of Recycled Water for Indirect Potable Reuse

An Advanced Recycled Water Treatment (ARWT) Facility project was endorsed by the Silicon Valley Leadership Group as a way to develop reliable, sustainable water sources for Santa Clara County. This project aims to improve the quality of recycled water to aggressively protect the groundwater basin through aquifer (groundwater) recharge and expand the current user base to industries and processes that require high quality water.

ARWT is expected to facilitate future use of recycled water for irrigation in sensitive areas and increase industrial applications. It would also mitigate salt impacts due to the proposed increases in industrial cooling towers and indoor water reuse in new developments. In addition, AWRT would enhance future options to pursue groundwater recharge and reuse.

The SCVWD and the SBWR program have developed a preferred AWRT project that involves a 10 mgd MF system, an 8 mgd RO system and a 10 mgd UV disinfection system to be constructed at the WPCP. State and federal funding has already been secured for a portion of the costs of this project. Further detail regarding this project is found in Appendix B.

In order to use the advanced treated recycled water for indirect potable reuse, the recycled water must be recharged to the groundwater basin. Before implementing reuse through groundwater recharge, there are regulatory, institutional and public perception issues that must be addressed. The SBWR program, SCVWD, and the City recognize that this will require a multi-year timeline and thus are currently in the process of investigating the regulatory issues related to the protection of the groundwater basin and identifying the institution and water rights issues associated with the implementation of the project. However, at this time, this project and need for aquifer (groundwater) recharge is expected to use about 10 mgd of recycled water by 2022 and remain approximately constant through 2040.

4.1.2 Onsite/Water Pollution Control Plant Use of Recycled Water

In addition to the increase in water reuse projected through the goals set by the Green Vision and Joint Water Study, there are multiple other onsite recycled water use opportunities congruent with the WPCP visions.

Currently, the WPCP uses recycled water for onsite irrigation and for WPCP process operation and maintenance. Although no specific onsite reuse projects have been identified, the WPCP will continue to use recycled water as process water for current treatment processes as well as any new treatment processes not yet in place.

The WPCP goals to more effectively manage land use and promote sustainability provide an opportune time to increase onsite recycled water use. Recycled water can be used for dust mitigation and as construction water during development/expansion of the existing facilities. Onsite recycled water use can also be used to construct new polishing/treatment wetlands, increase irrigation, and develop WPCP onsite park/green areas to increase aesthetic appeal and land value. At this time, an estimate for projected and/or increased onsite reuse has not been developed.

5.0 SUMMARY

A majority of the current recycled water use within Santa Clara County is used for irrigation/agricultural purposes. Therefore, the actual use of recycled water during any given year is correlated with the weather and rainfall during that year. During wet years, actual recycled water usage will likely be less than anticipated, as less water is needed for irrigation/agriculture. However, in the future, in conjunction with the Green Vision and the goals outlined in the Joint Water Study, the use of recycled water from the SBWR program will continue to increase.

Currently, the Cities of San José, Santa Clara, and Milpitas promote recycled water usage through a variety of actions. These actions are expected to assist the City meet its Green Vision goal (Goal 6) for increased use of recycled water, as well as assist SCVWD meet its recycled water use goals.

In the future, the SBWR program will continue to actively participate in regional water recycling initiatives like the Bay Area Recycled Water Coalition (BARWC), which currently coordinates funding requests from recycled water projects in the Bay Area.. Through these methods, the SBWR program will play a significant role in the near-term and long-term uses of recycled water throughout the San Francisco Bay area while assisting the WPCP to stay below its flow trigger and meet future regulatory limits.

REFERENCES

REFERENCES

1. San José/Santa Clara Water Pollution Control Plant, 2002 to 2007. Monthly WPCP Flow Monitoring Reports.
2. South Bay Water Recycling, 1998 to 2007. SBWR Invoice Data.
3. Stufflebean, John, 2008. Preliminary City of San José Green Vision Implementation Plan.
4. City of San José/Santa Clara Valley Water District Joint Water Study. http://www.sanJoséca.gov/clerk/Agenda/042408/042408jss_03.pdf.
5. City of San José, 2005. San José Municipal Water 2005 Urban Water Management Plan.
6. City of Milpitas, 2005. City of Milpitas 2005 Urban Water Management Plan.
7. South Bay Water Recycling Website. http://www.sanJoséca.gov/sbwr/.

APPENDIX A - CITY OF SAN JOSÉ GREEN VISION GOAL NO. 6

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: **Rules and Open Government Committee**

FROM: Mayor Chuck Reed

SUBJECT: **Green Vision**

DATE: October 5, 2007

Approved Chuck Reed Date 9/5/07

Add the following item to the October 30th Council Agenda:

RECOMMENDATION

A. Adopt the following ten goals identified in the attached Green Vision:

Within 15 years, the San José community will:

1. Create 25,000 CleanTech jobs as the World Center of CleanTech Innovation
2. Reduce per capita energy use by 50 percent
3. Get 100 percent of electrical power from clean renewable sources
4. Build or retrofit 50 million square feet of green buildings
5. Divert 100 percent of the waste from our landfill and convert that waste to energy
6. Recycle or beneficially reuse 100% of our wastewater (100 million gallons per day)
7. Adopt a General Plan with measurable standards for sustainable development
8. Ensure that 100 percent of public fleet vehicles run on alternative fuels
9. Plant 100,000 new trees and replace 100 percent of streetlights with smart, zero-emission lighting
10. Create 100 miles of interconnected trails

B. Direct staff to work though council committees to develop implementation strategies for each of the three elements in the document (CleanTech, Sustainability, and Green Mobility) for the reasons set forth in the Green Vision.

BACKGROUND

In 2005, San Jose adopted the goal of becoming a 'Global Sustainable City' and meeting the standards of the U.N. Urban Environmental Accords. In 2007, the City Council signed the U.S. Conference of Mayors' Climate Protection Agreement, and adopted the most aggressive municipal greenhouse gas emissions reduction goals in the nation.

The Green Vision is the roadmap for how we will meet our commitment to the Climate Protection Agreement and the U.N. Urban Environmental Accords.

Adoption of the Green Vision will help keep San José on the forefront of environmental protection while at the same time generating good paying jobs and increasing economic vitality.

This memo was coordinated with the City Manager and Redevelopment Agency

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Chuck Reed
MAYOR

SAN JOSE'S GREEN VISION

Our problems are man-made, therefore they may be solved by man. No problem of human destiny is beyond human beings.
– John F. Kennedy

For generations, San José has answered the call to change the world. Our innovations have helped move the world from the industrial age to the information age. Today, at the beginning of the 21st Century, we must step forward to help solve the climate and energy crises and protect our environment. In the process, we will help reduce our nation's dependence on foreign fossil fuels and build San José's economy.

The problems are significant. We rely on an uncertain supply of imported water from the Delta. We depend on fossil fuel – much of which comes from unstable regions around the globe – to run our cars, heat and cool our homes and offices, and operate our information society.

Many of us have begun to make changes in our daily lives to address these problems. We recycle more of our household waste than any other large city in the nation. We recycle and reuse 11 million gallons of wastewater each day. We are investing in green buildings. We are a leader in driving hybrid cars.

But we can and must do more. By using our local ingenuity, entrepreneurship, and creative talent, we can create solutions that change the course of global events. What better place than San José, the Capital of Silicon Valley, to create and test the technology that will harness the sun and wind, turn sewage into fuel, and turn garbage into energy.

The Clean Technology revolution is coming. By capitalizing on the innovation that already exists in our community, we can lead the effort. In the process, we will create thousands of new jobs, grow city revenues, expand our local economy, and demonstrate how deploying clean and green technology is fiscally responsible.

To do so, we must establish bold goals that will set San José on a course to lead the world in solving environmental challenges. Our goals focus on three elements: Clean Technology, Sustainability, and Green Mobility. This Green Vision is the roadmap. Our journey starts today.

Chuck Reed

Chuck Reed
Mayor of San José

200 East Santa Clara Street, 18th floor, San José, CA 95113 *tel* (408) 535-4800 *fax* (408) 292-6422 www.sjmayor.org

SAN JOSE'S GREEN VISION

Over the past fifty years, San José has transformed from the Valley of Heart's Delight to the Capital of Silicon Valley. From canneries and packing plants, we've moved to semiconductors and instant communications. We've attracted and welcomed ideas and talent from around the globe. Our residents, companies, and universities constantly move forward and solve the next challenge. We've become known as the world's center for innovation and entrepreneurship with ideas and inventions that have changed the world.

San José's spirit of innovation is inspiring entrepreneurs to develop the technologies that will ensure reliable, clean energy sources, reduce carbon emissions, minimize the use of non-renewable power, and mitigate harmful impacts on the environment.

We believe that ensuring a sustainable future for current and future generations requires new waves of Clean Technology innovation. Without Clean Tech innovation, communities will become more polluted, the effects of global warming will increase, and our consumption of fossil fuels will continue our dependency on foreign oil. Here in San José, local companies are already incubating and producing many of these technologies. They are leading the world in solar technology, alternative fuels, new transportation systems, efficient lighting, and energy monitoring systems innovation. They are transforming San José into a world center of Clean Tech innovation with thousands of new jobs and billions of dollars of new investment.

San José has also long been a leader in environmental stewardship. Our residents participate in and support the City's efforts to recycle garbage, conserve water, reuse wastewater, protect our foothills, and develop responsibly. San José successfully pioneered many commonplace environmental activities, from curbside recycling to our urban growth boundary. Building on our community's history of technological innovation and environmental leadership, San José will advance our Green Vision.

San José's Green Vision is a comprehensive strategy that will show the world how environmental responsibility makes financial sense and stimulates economic opportunity. We will lead the nation in becoming more energy efficient, producing and using electricity from

clean renewable sources, creating green buildings, diverting waste from landfills, creating greener street systems, delivering recycled water, and reducing greenhouse gas emissions.

This vision includes 10 bold goals that will serve as a roadmap to reduce the carbon footprint of the tenth largest city in the nation by more than half.

GREEN VISION GOALS

Within 15 years, the City of San José in tandem with its residents and businesses will:

1. Create 25,000 Clean Tech jobs as the World Center of Clean Tech Innovation
2. Reduce per capita energy use by 50 percent
3. Receive 100 percent of our electrical power from clean renewable sources
4. Build or retrofit 50 million square feet of green buildings
5. Divert 100 percent of the waste from our landfill and convert waste to energy
6. Recycle or beneficially reuse 100 percent of our wastewater (100 million gallons per day)
7. Adopt a General Plan with measurable standards for sustainable development
8. Ensure that 100 percent of public fleet vehicles run on alternative fuels
9. Plant 100,000 new trees and replace 100 percent of our streetlights with smart, zero-emission lighting
10. Create 100 miles of interconnected trails

Successfully realizing this vision will require a focused direction for action and a means of regularly measuring progress. By pushing the limits of what is possible, we will all achieve our vision and inspire change globally.

WORLD CENTER OF CLEAN TECH INNOVATION

15-Year Goal:

1. Create 25,000 Clean Tech jobs as the World Center of Clean Tech Innovation

It will take significant creativity and innovation to move the cities and countries of the world toward a more sustainable environment, just as it did to move the world from the industrial age into the age of silicon and high tech. More so than any region of the world, San José and Silicon Valley are defined by the ability and willingness to innovate and change. From the defense technologies of World War II, the semiconductors and computers of the information age, or the evolution of the Internet and the virtual world, our local innovations have changed the world.

In this tradition, San José, the Capital of Silicon Valley, will inspire the next wave of innovation: the Clean Technologies that will help the world face the growing climate crisis and meet unprecedented global energy needs. These technological innovations will harness the power of renewable energy sources, manage natural resources more efficiently, and reduce the environmental impacts of human activity.

As the world's most competitive knowledge economy and home to more than 1,500 of the world's largest technology firms, San José is positioned to become a world center of Clean Tech innovation. Numerous Clean Tech companies are already benefiting from the region's unrivalled access to venture funding, highly skilled workers and entrepreneurs, world-class research institutions, supportive government policies, and cutting-edge technology incubators like San José's Environmental Business Cluster and the San José BioCenter.

San José companies are inventing, demonstrating, and producing the innovations that will serve communities, businesses, and residents around the world. As a result, local residents are already seizing the emerging economic opportunities to find well-paying jobs that are unlikely to be outsourced.

As San José emerges as a world center of Clean Tech innovation, entrepreneurs, companies, and universities will develop technologies that will change the world and create economic opportunities for generations to come. To provide leadership for the long-term economic success

of this emerging industry sector, the City of San José developed its Clean Tech Strategy, which will be an integral component to achieving our Green Vision. The Strategy will ensure that this next wave of innovation occurs in San José and calls for unprecedented public-private partnerships to showcase Clean Tech products to the world, including:

- Providing incentives and services at every stage of growth to encourage both established Clean Tech companies and start-up firms to stay and grow in San José;
- Incubating next generation technologies through partnerships with local universities and the Environmental Business Cluster;
- Attracting innovative firms and talent from around the world;
- Providing demonstration opportunities for innovative Clean Tech products;
- Creating opportunities for local residents to receive training for employment in Clean Tech industries;
- Advocating for legislative changes that will support the Clean Tech industry's growth.

Through these efforts, we will ensure that local companies are able to develop and innovate. We will create more than 25,000 Clean Tech jobs, helping solve the world's environmental challenges, creating a sustainable future, and building San José's economy.

SUSTAINABILITY

15-Year Goals:

2. Reduce per capita energy use by 50 percent
3. Receive 100 percent of our electrical power from clean renewable sources
4. Build or retrofit 50 million square feet of green buildings
5. Divert 100 percent of the waste from our landfill and convert waste to energy
6. Recycle or beneficially reuse 100 percent of our wastewater (100 million gallons per day)

In addition to inspiring and incubating the technologies of the future, San José has a long history of adopting sustainable practices to confront environmental challenges. Across the nation, our city is respected for its environmental innovation and stewardship. Noteworthy accomplishments include highly successful recycling, water conservation, and wastewater management programs; forward-thinking design and development standards; and establishment of the first environmental incubator in the United States.

Recent actions by the San José City Council provide a solid foundation for achieving the goals of the Green Vision. In 2005, San José adopted the goal of becoming a 'Global Sustainable City' and meeting the standards of the U. N. Urban Environmental Accords. In 2007, after the City Council signed on to the U.S. Conference of Mayors' Climate Protection Agreement, it went one step further and adopted the most aggressive municipal greenhouse gas emissions reduction goals in the nation. As part of San José's ongoing environmental leadership, the City is working with residents, business leaders, and government officials to develop a climate action plan for Silicon Valley.

For more than a decade, environmental sustainability has been a guiding principal for the City of San José. We are a national leader in adopting and promoting practices that improve the quality of our air and water and that conserve land, soil, water, energy and ecosystems. To achieve our Green Vision, we must go farther. We will become a global leader in energy efficiency, renewable energy, green building, water conservation and recycling, and waste reduction.

ENERGY EFFICIENCY

Every year, San José homes, businesses, and public operations consume nearly 6.5 billion kilowatt hours of electricity, which contribute 40 percent of our community's 4.2 million total tons of greenhouse gas emissions. Through efficiency measures alone, San José residents and companies can significantly reduce our energy usage and collectively save billions of dollars that could be invested elsewhere.

Since 2001, San José government has significantly reduced its energy consumption by 200 million kilowatt hours through institution of basic efficiency efforts, resulting in an estimated savings of $20 million. It's an excellent start, but we can do much more.

We've set a goal of reducing our per capita energy consumption by half in the next 15 years and to convert to using 100 percent renewable electrical power. The City of San José will lead the way in this effort, but we haven't set the goal for government alone. Everyone, from residents to businesses, can cut consumption and reduce reliance on foreign fossil fuels.

HISTORY OF LEADERSHIP: EFFICIENCY AND CLEAN ENERGY

2002: Awarded "Flex Your Power" award for leadership in energy efficiency activities.

2007: Awarded "Solar City Award" from NorCal Solar for having most solar installations of any large city in Bay Area.

The City Council adopted most aggressive municipal greenhouse gas reduction goal in nation, committing to cut municipal greenhouse gas emissions. The City of San José will reduce its greenhouse gas emissions by 25 percent from 1990 levels over the next five years. By 2030, this will increase to 50 percent and 80 percent by 2045.

We will encourage everyone to adopt innovative and smarter energy devices, and to change habits or employ applications that will reduce energy consumption needs and operating expenses. We will demonstrate that energy efficiency saves money and is worth the upfront investment.

The City of San José will partner with residents, private sector entrepreneurs, and civic organizations to become more efficient and to encourage the adoption of innovative efficiency products, including efficient lighting, energy monitoring systems, cool and green roofs, insulation, and smart cooling systems.

The City will also partner with the United States Department of Energy, the Environmental Protection Agency, Pacific Gas and Electric Company, and other organizations to measure our energy consumption and develop implementation strategies for efficiencies. As a result of these efforts, we believe that the San José community will reduce its electrical energy consumption by 50 percent per capita in 15 years.

Renewable Energy

Currently, only 12 percent of the electrical power used in San José comes from renewable sources. At 6.5 billion kilowatt hours a year, switching to 100 percent clean renewable energy sources will drastically reduce San José's carbon footprint.

Providing affordable renewable options to all electricity users in San José is an ambitious goal, and it will require both innovation and investment. One means of achieving this goal is through solar energy. Governor Schwarzenegger has set a goal of 1 million solar roofs for California, and we believe that San José can supply 10 percent of this total. We have the sunshine, and the solar technology innovations are being developed here.

The City of San José can both save money and help the environment by installing solar on our City facilities, and we can make it easier for individuals and business to do the same. We will support power purchase agreements, helping to facilitate the procurement of solar energy technology. Through partnerships with residents, private sector leaders, and civic organizations, San José will become a national solar showcase with cutting-edge demonstration projects, residential and commercial bulk purchasing arrangements, and solar-powered public buildings. In addition to harnessing solar power, San José will also support the development of innovative technologies and evaluate the use of other clean energy sources, such as wind, water, geothermal, hydrogen, electrochemical and fuel cell technologies, and biomass.

Green Buildings

Ensuring sustainable construction and promoting green building practices are an essential component of our Green Vision. An estimated 40 percent of the community's total energy use and 16 percent of its water goes to buildings. We can change this by building green or retrofitting our existing buildings to reduce energy and water use and incorporate sustainable construction

materials. This will significantly reduce our carbon impact. Our goal is big: In 15 years, San José will be home to 50 million square feet of green buildings – the equivalent of nearly 100 buildings the size of San José City Hall.

HISTORY OF LEADERSHIP: GREEN BUILDING

2001: City adopts Green Building Program.

2002: City's Green Building Program received "Environmental Award" from Acterra.

2007: Established LEED™ Gold as the goal for all new City facilities.

Whether new construction or retrofitted structures, these buildings will meet high environmental standards, such as achieving a U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED™) certification. These energy efficient buildings will provide a showcase for local Clean Tech products as well as innovations in green building materials, local commitment to sustainable practices, and the fiscal benefits of building green. The City of San José has already started at home. We recently opened the first green community center, the Starbird Teen Center, and plan to do more. The City also has adopted aggressive standards for requiring green building practices for City facilities and will work with private-sector partners to ensure sustainable commercial and residential construction.

In addition to facilitating new green construction, we will work towards reducing energy use and carbon emissions of existing buildings by encouraging owners to upgrade air conditioning, heating and ventilation systems, retrofit lighting systems, and adopt other green building practices. We will also support innovation in green building materials and systems technology, raise awareness of the benefits of green practices, and provide incentives for individuals who want to build green and use Clean Tech products.

WASTE REDUCTION

HISTORY OF LEADERSHIP: WASTE RECYCLING

1987: Instituted residential recycling citywide.

1989: Recognized as State model for recycling.

1991 & 2002: Recognized for diverting more waste than any large city in nation (64 percent).

Present: Continue to divert more waste than most other large cities in the world.

We want San José to become a zero waste city. Instead of sending 712,000 tons of garbage to our landfills annually, we will work to divert 100 percent of the waste we generate. Currently, we recycle 62 percent of our garbage and trash citywide. San José residents recycle 286,000 tons each year through the curbside Recycle Plus program alone.

First, we'll start by reducing the quantity of waste we create. We will increase the amount we recycle, and we'll reuse more products. In addition, San José will become a world leader in adopting cutting-edge technologies that transform waste into usable energy. Through partnerships with innovative companies, San José will convert solid waste and biosolids into biodiesel, methanol, biogas, and electricity that will power municipal operations and be available to other users.

Water Conservation & Recycling

As California grows, having a reliable water supply becomes even more critical. San José is already a world-leader in water recycling, but we can do more. We must lead by example, not only by maximizing water conservation efforts, but by increasing the quantity of recycled water we produce and distribute. Recycled water has proven its value for irrigation, cooling and manufacturing, and there are many opportunities for growth in these uses.

Today, San José's South Bay Water Recycling recycles about 11 million gallons per day, reaching customers through 110 miles of dedicated piping. By connecting new users to the pipelines and by expanding the system, San José can double the amount of recycled water delivered to major businesses, City parks and landscaping, and school grounds.

History of Leadership: Wastewater & Water Recycling

1956: San José builds wastewater treatment plant to protect San Francisco Bay.

1979: Plant evolves into one of the world's largest, most advanced treatment facilities, and supports growth of Silicon Valley.

1990: Partnered with private sector to reduce discharge of industrial copper and nickel into Bay by 50 percent.

1991: Adopted South Bay Action Plan to ensure drought-proof water resource for Silicon Valley.

Present: South Bay Water Recycling is largest urban recycled water program in Northern California.

Over the next 15 years, we will achieve 100 percent beneficial reuse of the wastewater we capture and treat – 100 million gallons per day – through a combination of water conservation, expanded use of recycled water, and habitat protection. By making the most of this reliable water source, we will ensure that San José and surrounding communities have a sustainable water supply for future generations.

GREEN MOBILITY

15-Year Goals:

7. Adopt a General Plan with measurable standards for sustainable development
8. Ensure 100 percent of public fleet vehicles run on alternative fuels
9. Plant 100,000 new trees and replace 100 percent of our streetlights with smart, zero-emission lighting
10. Create 100 miles of interconnected trails

In Santa Clara County, more than 40 percent of our greenhouse gas emissions come from cars, trucks, buses, trains, and other transport. These surface transportation systems are among the largest users of energy and, not surprisingly, the greatest contributors to poor air quality.

While San José has made great strides in recent years to implement sustainability standards for transit-oriented development and urban design, we must take these efforts to the next level. We must create integrated and sustainable ways to get from place to place – a Green Mobility system. We must take action now because, over the next 30 years, the population growth in San José alone is projected to be greater than the growth in San Francisco, Oakland, and Fremont combined.

HISTORY OF LEADERSHIP: URBAN DESIGN

San José is a leader in developing and implementing forward-thinking General Plan documents:

1975: Adopted first General Plan, included plans to end urban sprawl and intensify downtown development.

1984: Adopted Green Line Strategy and sought to preserve habitat lands.

1994: Established Sustainability as a major strategy and incorporated targets for transit-oriented design, mixed use development, and transportation choice.

2005: Expanded transportation fees to fund improvements of sidewalks, trails, and transit systems in addition to roadways.

We must prepare for this population growth to prevent gridlock and pollution. To develop a system of Green Mobility, we must reduce reliance on single-occupant vehicles and ensure that alternative transportation is efficient, convenient, and environmentally sustainable. By focusing on long-term land use planning, reducing emissions from vehicles, embracing clean transportation technology, creating smart green streets, providing pedestrian and bicycling opportunities, and creating a green airport, San José will achieve its vision of Green Mobility.

LONG-TERM PLANNING

Urban design and land-use planning are critical to the success of San José's Green Vision. We must continue to lay a foundation for the future by clearly establishing sustainable development standards in our General Plan. We must promote high-density commercial and residential development near transit or on in-fill sites. We must limit low-density housing. Instead, we will encourage builders to create opportunities for residents and employees to walk to retail, entertainment venues, parks, and schools in all neighborhoods. The General Plan Update, *Envision San José 2040*, will include clear and measurable standards for sustainable development.

EMISSION REDUCTION

Green Mobility must also focus on getting people around with the express intent of cutting carbon emissions by decreasing dependency on the automobile and reducing the impacts of the vehicles we must use. We must expand the use of public transportation by creating more Bus Rapid Transit lines, encouraging more people to ride light rail and share vehicles, developing subscription bus service, building BART, and bringing high-speed rail to San José.

San José will lead by example by replacing its city fleet with green vehicles and providing support for alternative vehicles with public plug-in stations and access to alternative fuels. We can install solar systems and energy efficient lighting at our parking facilities. Implementing directional signage will prevent cars from idling while looking for spaces, reducing emissions.

We will encourage the development of smaller, lighter, and alternative fuel vehicles for mass and private transit to reduce adverse impacts on our environment. The City of San José is establishing a center to stimulate the development of such clean, alternative fuel vehicles using Silicon Valley technology.

Partnerships with San José educational institutions will promote walking to school and using zero-emission buses. We will also create local policies to encourage residents and businesses to use zero-emission and hybrid vehicles, and we will advocate for State and Federal legislative action for additional investment in research and consumer incentives.

SMART, GREEN STREETS

From traffic signals to streetlights, we can make San José streets smarter and environmentally friendly. We will adopt advanced technology such as light emitting diode (LED) efficient lighting, solar-powered lighting systems, and message and traffic intelligence programs to move traffic efficiently.

We will test new ways to pave streets, parking lots, sidewalks, and trails. New pervious surfaces, which allow water to penetrate the surface, offer great promise for being better for our environment. By expanding the urban forest, we will cool our streets and sidewalks, clean our air, improve water quality, and help convert carbon dioxide emissions to oxygen.

We must encourage more pedestrian and bicycle travel. One option is to install attractive, covered facilities along City sidewalks that will make it more convenient and comfortable for residents to walk and cycle. These cooling stations would serve as bike lockers or benches where people can rest or wait for a bus. At the same time, the stations would collect solar power to run adjacent streetlights.

Expanding our system of park trails to 100 miles will allow residents to travel more easily by bicycle or on foot, as well as encourage exploration and education about our natural habitat so residents better understand the benefits of a healthy environment and value its preservation.

GREEN AIRPORT

Airports provide numerous opportunities to improve the impacts of moving people and goods. The Norman Y. Mineta San José International Airport will become a global model for environmental responsibility by using green building materials in its construction. The airport will also generate alternative energy, implement energy efficient practices, mitigate noise, and enact initiatives to protect air quality. In addition, San José will continue its leadership in using alternative energy vehicles for airport operations and encouraging the use of zero-emission modes of transportation to get to and from the airport.

FIFTEEN YEARS STARTS TODAY...

The actions that we take today will ensure a sustainable future tomorrow. With our history of innovation and environmental stewardship, it's natural that San José lead this effort and provide solutions to the world. Through innovative partnerships with Clean Tech companies and leaders throughout our community, we will help solve the climate crisis while creating a new economic base for our region. San José will show the world that environmental responsibility makes financial sense.

We cannot accomplish these goals alone. San José's Green Vision can only be accomplished with the help and participation of every member of our community. It won't be an easy task. It will require unprecedented partnerships between the City, residents, businesses, schools, and universities. It will require changing policies locally and advocating for aggressive change and investment at the State and Federal levels. Most importantly, it will require the enthusiasm and participation of every resident of San José.

Our goals are ambitious. However, together we can make this Green Vision a reality and ensure a sustainable environment for generations to come.

APPENDIX B - JOINT WATER STUDY: A SHARED VISION FOR RECYCLED WATER

How We Measure Water

Fact Sheet #1
Slides: All

An acre-foot (AF) is a unit of measurement commonly used to quantify large-scale volumes of water, including the amount delivered to households and the amount available in bodies of water. One acre-foot is the amount of water necessary to cover one acre (e.g., almost one football field) to a depth of one foot. An acre foot is equal to 325,851 gallons or 43,560 cubic feet (1,233 cubic meters) of water.

A related measurement is an acre-foot per year (AFY). This measurement is used in many water-management agreements and water planning reports. One acrefoot per year is generally enough water to serve the needs of two households of five residents per household for one year.

Gallons

The U.S. gallon unit of volume is used primarily in measuring daily water operations. The water flow over time is calculated in units of million-gallons per day (MGD). One million gallons per day (MGD) is approximately 1,121 acre-feet per year (AFY). The District operates three water treatment plants with a design maximum water production of 42 MGD (Penitencia), 100 MGD (Santa Teresa Water) and 80 MGD (Rinconada). The San Jose/Santa Clara Water Pollution Control Plant is designed to treat up to 161 MGD.

Volume	Acre-Foot (AF)	To gallons (gal)	**325,851**
		To Hundred Cubic Feet (CCF or HCF)	**435.6**
		To cubic meters (m^3)	**1,233.5**
		To liters (l)	**1,233,500**
Flow	Million Gallons Per Day (MGD)		**1,121**
	Gallons Per Min. (GPM)	Acre-Foot per Year (AFY)	**1.614**
	Cubic Feet Per Second (CFS)		**724.5**
	Liters (l)		**0.4264**

Water Retailers Measure – CCF or HCF

One Hundred Cubic Feet (either CCF or HCF) is the volume unit most commonly used by water retailers to meter a home's monthly water usage. A home water bill generally is shown in CCF or HCF units.

In 2007, residents and businesses in Santa Clara County used approximately 400,000 acre-feet (357 MGD) of potable water. The average monthly water usage per household in San José was 15 CCF (11,220 gallons or .3 AF) and the current average cost was $43 per month.

Water flow rates through streams are typically measured in cubic feet per second (CFS). Cubic feet per second represent the speed (fluid velocity) at which the water flows (approx. 7.48 gallons per second). Excessive water speeds can lead to pipe failures, stream bank erosion, and flooding. Typical District pipelines are operated at flow speeds of approximately 5 CFS, while stream flows are more variable. Real time local stream flow measurements are available on-line via the ALERT program, which is linked to 70 stream flow meters on the various streams throughout the county.

Water Supply Reliability

Fact Sheet #2
Slides 8-18

As the water management agency and principal water wholesaler for Santa Clara County, the District is responsible for planning to meet current and future demand for water for the county. The District does its water supply planning in collaboration with San Francisco Public Utilities Commission and water retail agencies in the county.

Water supply reliability includes the availability of water as well as the integrity of the infrastructure and systems that retrieve, store, transport, treat and distribute it. The District strives to meet water demand under all hydrologic conditions, including satisfying its treated water contracts for deliveries to the retail agencies and managing the groundwater basins so that water can be pumped from wells.

Water supply conditions change from year to year because of natural variations in hydrology. In addition, the District operates in an environment of uncertainty and must respond to institutional, regulatory and political risk factors that affect its ability to meet water demand. 2007 was a particularly challenging year with dry year conditions, legal challenges, and regulatory constraints on imported water supplies.

In May 2007, a federal court decision invalidated the Biological Opinion issued by the U.S. Fish and Wildlife Service for operation of the State Water Project (SWP) and Central Valley Project (CVP) with regard to an endangered species, the Delta Smelt. The court ruling, which imposes restrictions on pumping in the Delta, will be in effect until a new Biological Opinion is issued to guide the operations of the two water projects.

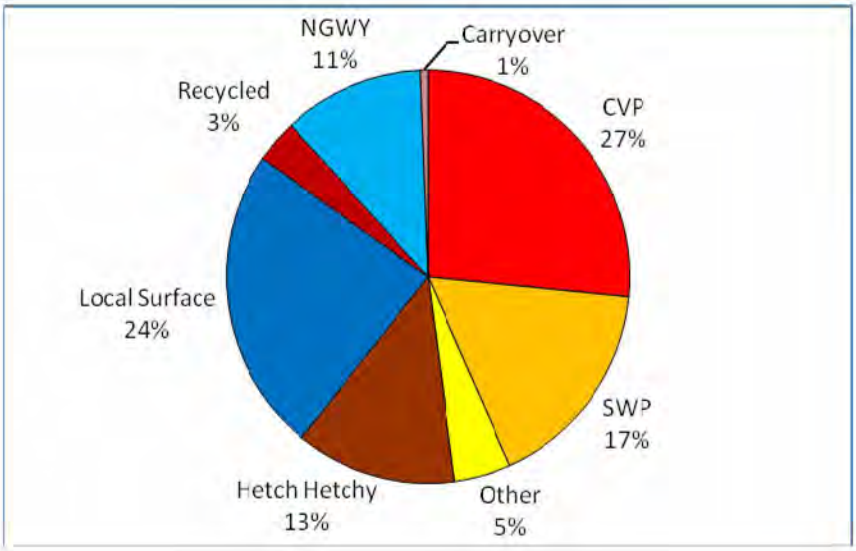


Figure 1: 2006 Water Sources for Santa Clara County

The court order has the potential to impact District water supply and operations in three key ways. It is estimated that overall deliveries will be cut by 10% to 25%, depending on the location of the Delta Smelt and river flow conditions. Secondly, because specific pumping reductions cannot be predicted, the two water projects can not finalize their annual allocations until later in the year, extending the period of supply and operational uncertainty. And finally, limits on Delta pumping will increase the draw on water in San Luis Reservoir,

which could exceed the allowable reservoir withdrawal rate. The District may be unable to meet immediate surface water demands under such circumstances.

All of these factors were taken into account to develop a probable range of scenarios and contingency plans for 2007 and 2008. The strategy will be continuously updated throughout the year to account for operations to date and real-time conditions.

As the region's population continues to grow, the demand for water will increase. A number of factors have to be considered to ensure that future water supply is reliable, including: climate change, environmental issues locally and in the Delta, more stringent regulations, aging infrastructure and the costs to develop other supplies. In the coming year, the District will update its Integrated Water Resources Plan to account for changing circumstances and new conditions.

The District manages and addresses risks and uncertainties by building a diversified portfolio of water supply alternatives. The portfolio of existing dry-year supplies and new water supply investments is intended to meet at least 95% of future water demands. To secure long term water supply, reliability, and regulatory certainty, the District continues to engage in statewide, regional and local collaboration and partnerships.

Furthermore, the District's long-term water supply planning combines sustainability principles with water resources and watershed stewardship planning. This robust, integrated approach provides a sound planning framework that maximizes protection and efficient use or existing resources while minimizing risks from uncertainties and stranded assets.

Global Warming & Climate Change

Fact Sheet #3
Slides 13, 14, 17

Global Warming is a term used to describe the heating of the Earth's surface from a buildup of specific "greenhouse" gases in the atmosphere. Like a greenhouse window, greenhouse gases allow sunlight to pass through the atmosphere, but then prevent heat from escaping. The greenhouse effect is a natural phenomenon that is essential to keeping the Earth's surface warm. Without it, there would not be life as we know it. It is the increases in specific greenhouse gases, such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), halocarbons, and ozone (O3)—mostly from burning fossil fuels—that are trapping excess heat in the atmosphere and are warming Earth's surface faster than at any other time in recorded history. It is a commonly accepted fact among reputable scientific institutions worldwide that the Earth's surface is warming. These institutions include the U.S. Environmental Protection Agency, University of Oxford, United Nations Environment Program (UNEP), World Meteorological Organization (WMO), US Climate Change Science Program, Okanagan University College in Canada, and more. The predicted increases in the Earth's surface temperature will significantly affect climate, public health, agriculture, snow accumulation and storage, water resources, sea levels, forests and landscapes, and glaciers.

The Santa Clara Valley Water District and the City of San José are at the forefront of addressing global warming and climate change issues at the state and national level. The City and District have partnered with Sustainable Silicon Valley's CO2 Initiative--a key strategy to respond to climate change resulting from the accumulation of human-generated greenhouse gases like CO2 in Santa Clara County. Both agencies are taking action right now by changing the way they manage energy usage and optimizing operations to increase are energy efficiency. In addition, joint water conservation programs have resulted in some of the biggest energy savings of any programs in the County.

The terms *global warming* and *climate change* are often used interchangeably. However, there is a distinction. Climate change is a broader term that covers all the anticipated effects of climatic changes beyond just the rising temperatures implied by the term global warming.

Rising global temperatures are melting off the world's glaciers and the polar ice caps at an alarming rate. The resultant rise in sea levels is likely to have global consequences. Of particular concern to Santa Clara County is the potential for a catastrophic failure of the San Francisco-San Joaquin Bay Delta levee

system, through which about half of our annual water supply passes. Failure of these levees would not only decrease the quantity of imported water available to the county, but it would also increase the salinity of Delta water, adversely impacting water quality and Bay-Delta ecosystems. In addition, rising sea levels will also result in coastal flooding and increased saltwater intrusion into our groundwater basins. The effects of climate change extend beyond water supply concerns. Temperature and precipitation changes also affect plant life, potentially changing habitats resulting in further loss of some plant and animal species—some already endangered. In addition, flood protection structures may not be able to handle higher water levels and rising tides could overwhelm levees in the South Bay.

The above scenarios represent the potential impact of climate change over the next several decades. They present significant challenges that will be very difficult and expensive to overcome.

The Water District is addressing the climate change challenge and related uncertainties at two levels. The first, proactive, step is to change practices and increase efficiency so as to not exacerbate the problem. The second level is to specifically assess vulnerabilities and risks due to climate change and incorporate the results of the assessment into all District planning for water supply, flood management, business and strategic plans.

Over the past 15 years, the Water District led water conservation and recycling programs have saved over 1.4 billion kilowatts of energy, and reduced air pollution by an amount equivalent to removing 72,000 cars from the roads. In 2006, the District achieved 96% of energy use from renewable sources.

On Jan 29, 2008, the District Board of Directors passed a resolution that reaffirmed the Board's aspiration to:

1. Continue to exercise leadership in initiatives, programs and policies that address climate change while furthering the District's mission;
2. Apply understanding of climate change and related impacts as appropriate in water supply plans, flood management project plans, asset management and infrastructure plans, California Environmental Quality Act assessments and environmental impact reports, energy management plans, business plans, and strategic plans; and
3. Strive to minimize its greenhouse gas emissions related to utilization and management of water resources; and
4. Enhance community understanding of climate change and how it challenges the District's mission.

In addition, the Board adopted a set of policies directing the integration of change considerations into District planning and operations. It formed a Climate Action Team to facilitate the integration and furtherance of the District's mission and the newly adopted policies. Building on past successes, the District continues to provide a systematic framework for integrating mitigation and adaptation to climate change into all of the District's activities, which will include early or no-regret actions, refinements to existing operations, and identifying services/programs that needed expansion, and capital investments needs. Partnership, collaboration and knowledge-sharing and better decision support tools are keys for responding to climate change.

In May of 1995, the San José City Council adopted a resolution to participate in the Cities for Climate Protection Campaign sponsored by the International Council for Local Environmental Initiatives (ICLEI). The array of actions and activities that have followed are described below and have contributed to a reduction in greenhouse gases in addition to the City's energy programs. The emission reductions achieved as a result of the energy efficiencies within City facilities equate to reducing over 89,000 metric tons of carbon dioxide – equivalent to not driving more than 19,000 cars for one year -- or recycling 30,000 tons of solid waste instead landfilling it.

The goals of the 1995 campaign were to:

- Strengthen local commitment to reduce greenhouse gases;
- Utilize management and planning tools developed by ICLEI to determine local energy use and develop strategies for conservation;
- Promote best practices to reduce energy use in buildings and transportation; and
- Enhance national and international ties through a collective voice for municipalities.

Within that adopted resolution, San José pledged to:

- Incorporate the goal of greenhouse gas reduction in the policies and programs being pursued under the Sustainable City Major Strategy and sustainable city energy strategy;
- Review the variety of energy conservation and efficiency measures that the City is currently pursuing and assess the greenhouse gas reduction that will be achieved by each measure;
- Identify for implementation those measures that achieve significant greenhouse gas reductions; and
- Continue to advocate for energy efficiency and climate protection at the regional, state and national levels.

San José has fulfilled this pledge through the Sustainable City Program activities that occur throughout city departments. In particular, the City's adopted Sustainable Energy Policy and Action Plan contribute to that effort. The purpose of that policy is to create a community where energy is generated and used in the most sustainable manner possible. One of the goals within the Sustainable Energy Policy is to "Promote and achieve a cleaner and healthier environment, including improving air quality and reducing greenhouse gas emissions."

The City achieves this goal through policies and programs that:

- Reduce petroleum consumption in municipal fleets through improvements in fleet fuel efficiency, the use of alternative fuel vehicles and alternative fuels.
- Reduce petroleum consumption in the private sector through improvements in fleet fuel efficiency, the use of alternative fuel vehicles and alternative fuels.
- Support and expand the City's Smart Growth policies which lead directly to improved air quality through reduced vehicle miles traveled.
- Reduce the urban heat island effect through the adoption of cool communities' actions.

Conservation

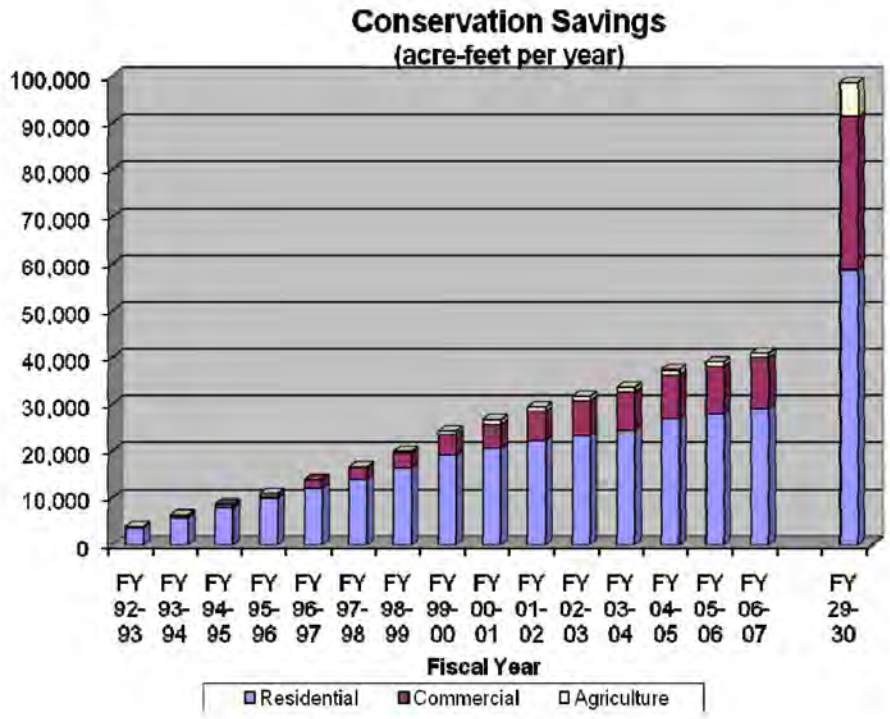
Are each in a

Fact Sheet #4
Slides 20-33

Water conservation, a program widely supported by the public, offers a variety of benefits countywide. Besides meeting long-term water reliability goals, water conservation programs help meet short-term demands placed on the water supply system during critical dry periods. Conservation reduces wastewater flows to Bay Area treatment plants, thus avoiding or deferring facility expansions while protecting the Bay's salt marsh habitat. Water conservation also saves energy, thereby reducing air pollution and greenhouse gas emissions, and helps reduce the frequency of across the board conservation requirements (e.g.; last year's request for 10% conservation) on water retailers and consumers.

Since FY 92-93, City indoor conservation programs, mostly funded in cooperation with the District, resulted in over 9,000 acre feet total of indoor water conservation throughout the Treatment Plant service area. Countywide, the District sponsored programs have achieved approximately 41,000 acre-feet per year of indoor and outdoor water conservation countywide (see chart below). These conservation efforts, as well as the efforts by the other cities and the water retailers, have resulted in a decrease in countywide per capita water use over time. Current per capita water use is below the per capita water use in 1987.

The District's adopted goal for water conservation is 100,000 acre-feet by 2030. By comparison, annual conservation goals for other Bay Area water agencies range from 10,000 acre feet savings by 2050 (Contra Costa Water District) to 45,000 acre feet by 2020 (East Bay Municipal Utility District, which serves Alameda and Contra Costa counties).



As signatories to the California Urban Water Conservation Council's Memorandum of Understanding, the District and the City's Municipal Water System are obligated to implement a variety of urban water conservation programs. Additionally, under the Central Valley Project Improvement Act, the District is also required to implement various agricultural water conservation programs. Finally, due to the overall cost-effectiveness of water conservation, both the District's 2005 Urban Water Management Plan (UWMP) and its 2003 Integrated Water Resources Planning document call for significant conservation savings – 100,000 acre-feet by 2030 of which 70,000 acre-feet is expected to come from the current portfolio of programs and an 30,000 acre-feet will come from new initiatives (known in the District as the "No-Regrets" package). Achieving these goals will require considerable collaboration with local cities and state-wide initiatives.

The City funds conservation solely with Fund 513 (Treatment Plant Operating Fund), due to the flow reduction needs of the San Jose/Santa Clara Water Pollution Control Plant. Since the goal is to reduce flow to the Plant, the City only funds indoor water conservation programs throughout the tributary area. It does not fund any outdoor conservation. District conservation funding comes from wholesale water revenue and grants such as Prop 50 and Prop 13 funds and cost-sharing. Annually, the District secures from $1 to $2 million in grant funding and approximately $500,000 to $1 million in cost-sharing for conservation activities countywide. Cost-sharing leverages the amount each agency has to spend on its programs, thus making them more cost-effective.

The tremendous volume of water savings cited above is due to our joint successes in securing grant funding and cost sharing. The two agencies have engaged in a cost-sharing agreement since FY 1998. For instance, in FY 07-08, the City is helping to finance District programs with $547,000 in cost sharing and the District is helping to finance the City with $280,000 in cost sharing. The District portion is larger because it takes a bigger role in program administration at this point.

Equipment retrofits and replacements in residential and business settings are the primary means of achieving water conservation. Equipment replacements can include replacing pre-1992 toilets with High Efficiency Toilets that flush with just one gallon of water, replacing washing machines with high efficiency machines, replacing "pre-rinse sprayers" used in food service settings with water-conserving sprayers, and changes to cooling tower equipment. Considerable conservation potential lies in outdoor conservation as well (landscape irrigation, etc.).

The District and City currently implement over 20 different water conservation programs that use a mix of incentives and rebates, free device installation, one-on-one home visits, site surveys, and educational outreach to reduce water consumption in homes, businesses and agriculture. Further opportunities exist

in the development of ordinances that require the use of the most water and energy efficient fixtures.

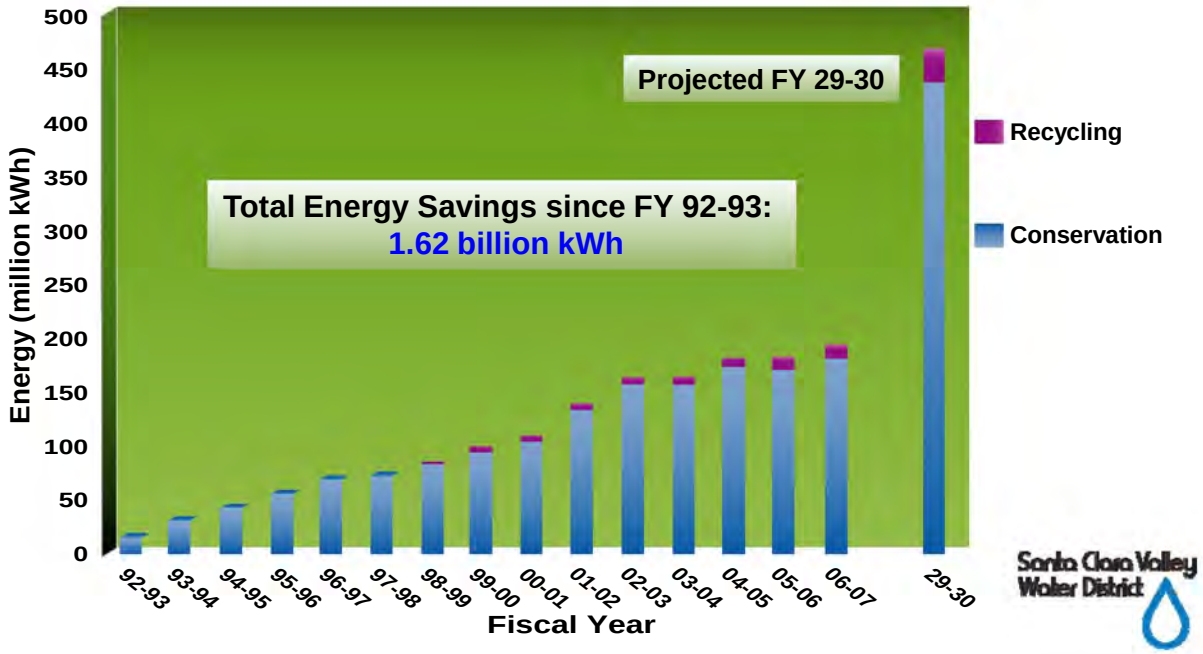
While the City has several ordinances prohibiting wasting water, there are further opportunities to save water with ordinances that apply to new development, improve landscape standards for new and existing development, and retrofit toilets upon resale. Morgan Hill, for example, has recently enacted such ordinances (e.g.; Ordinance 18.73 was added to the Municipal Code to require water conserving landscapes).

The amount of conservation achieved by each technology and program strategy varies. It also varies by the setting in which it occurs. For instance, a toilet replacement in a restaurant (~48 gallons per day, or gpd) achieves more conservation than a toilet replacement in a hotel (~16 gpd) because the restaurant toilet is used much more frequently. A pre-rinse sprayer valve replacement in a restaurant may achieve 150 gpd in conservation. Other factors influence the cost-effectiveness of conservation activities. For instance, the types of programs used to install a water-conserving fixture vary in cost. A toilet rebate may cost $100 while a full-service toilet retrofit program may cost $250 per fixture. Grant funding and cost sharing may make the difference between a cost-effective program and one that is not. To make a program cost-effective, the recipient of the technology (for instance, a private residence) may have to help fund a conservation strategy, such as a toilet retrofit. All these factors are considered in conservation program development to ensure that the most cost-effective and equitable conservation strategies are employed.

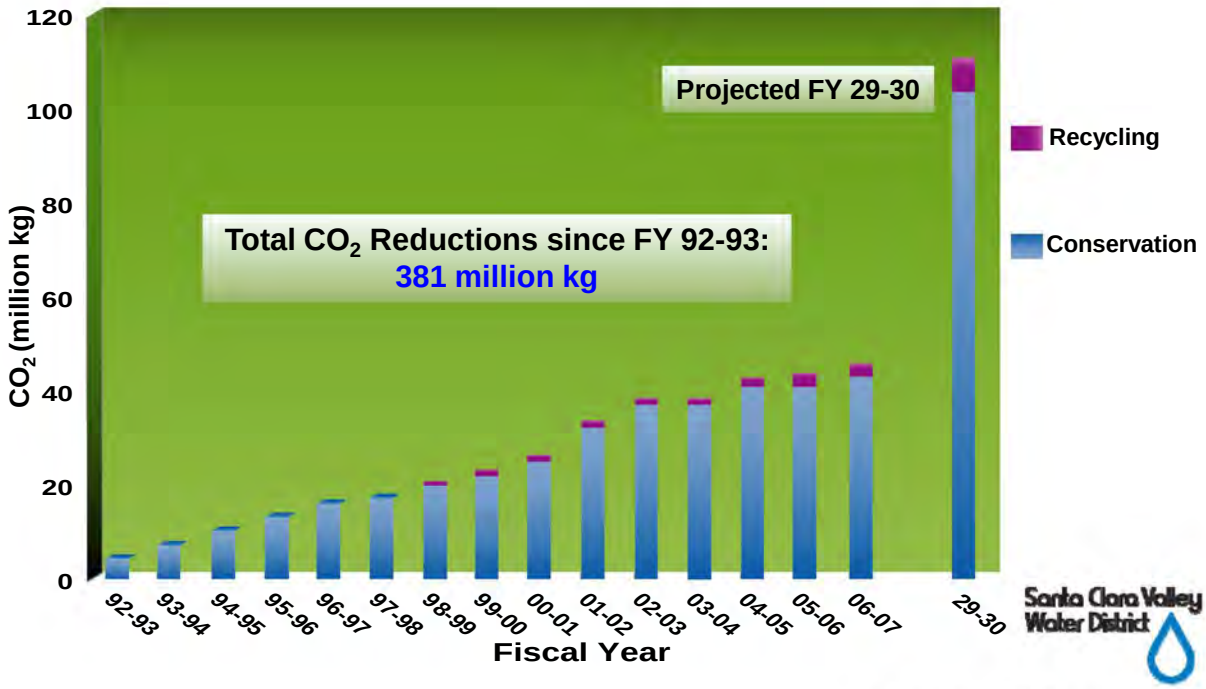
The water supply and treatment system (pumping water from its source, conveyance, water treatment, distribution, end use, and wastewater treatment) is the single largest user of energy in California. Therefore, water conservation (and water recycling) saves energy and thereby reduces air pollutant emissions, including emissions of carbon dioxide, a greenhouse gas. Using the Water to Air Model developed by the Pacific Institute, the District estimates that, from FY 92-93 through FY 06-07 , local water use efficiency programs (conservation and water recycling) have saved approximately 1.62 billion kilowatt-hours (kWh) of energy (see chart below). This represents a financial savings of approximately $208 million and is equivalent to the annual electricity required for 236,000 households. Through saving energy, the programs also eliminated approximately 381 million kg of carbon dioxide, the equivalent of removing 82,000 passenger cars from the road for one year.

Climate change will affect water availability through changes in hydrology, precipitation patterns, and drought cycles, offering further imperatives for conservation and recycling.

Energy Savings from Water Use Efficiency Programs



Carbon Dioxide Reductions from Water Use Efficiency Programs



A Shared Vision for Recycled Water Use

Fact Sheet #5
Slides 34-54

- **Green Vision Goal #6**: Recycle or beneficially reuse 100% of our wastewater by 2022.
  - Increase SBWR nonpotable reuse by 100% to 20 MGD (City lead).
  - Pilot and implement a 10 MGD streamflow augmentation project (District lead).
  - Pilot and implement a 10 MGD groundwater recharge reuse project (District lead).
  - Confirm benefit of 60 MGD discharge to maintain South Bay ecosystem (City lead).
- **District Ends Policy:** Use recycled water to fulfill 10% of the water demand county-wide by 2020
  - Reuse 45,000 acre-foot per year (AFY) out of projected 450,000 AFY demand (approximately 40 MGD).

NOTE: The bullets below are not part of the UWMP or District policy.

- Use recycled water instead of drinking water for industrial cooling.
  - Convert public facilities to recycled water use for cooling and market recycled water to adjacent industries.
  - Require recycled water for cooling in new industrial facilities near pipeline.
- Connect customers near SBWR pipeline.
- Extend SBWR pipeline to new developments and existing large customers.
  - Extend SBWR pipeline to serve recycled water to customers along N. First Street.
  - Require recycled water use and extend SBWR pipeline to serve future developments.

- Use recycled water to augment flow to enhance or restore county streams where appropriate.

- ❖ Design and build Advanced Recycled Water Treatment (ARWT) at San Jose/Santa Clara Water Pollution Control Plant.
  - 8 MGD microfiltration/reverse osmosis.
  - $53 million total project cost; $8.5 million available in state and federal grants.
  - Operating cost $3-4 million/year.
  - See attached Fact Sheet #7.
- ❖ Design and build future satellite groundwater recharge reuse facilities
  - Advantages:
    - More cost effective compared to expanding non potable recycled water uses.
    - Water can be used for all purposes (after groundwater recharge).
  - Challenges
    - Requires significant public education and outreach.
    - Product water and recharge procedures are highly regulated.

Streamflow Augmentation With Recycled Water

Fact Sheet #6
Slide 42

Since late 2003, the District has been evaluating streamflow augmentation on Upper Silver Creek, a tributary to Coyote Creek. The project began with a multi-year sampling effort to determine baseline conditions and moved through the environmental and permit processes. Prior to that, the City had conducted streamflow evaluations on Coyote Creek in the 1990s. The goal of the District's project was to determine whether it is feasible, within economic, environmental and county-wide policy objectives for water supply management, to augment flows in the Coyote Creek watershed with tertiary-treated recycled water. The District coordinated with the City of San José to utilize South Bay Water Recycling (SBWR) Program's recycled water for the project.

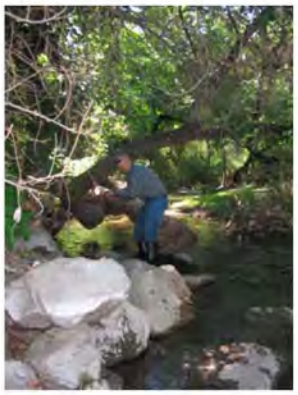
Streamflow augmentation could have direct water supply and environmental stewardship benefits for the District, the City, and the communities they serve. If successful, recycled water can be used to keep live streams flowing, and reservoir water that is currently used for streamflow augmentation can be saved and used for other purposes. Moreover, an additional benefit in augmenting creeks with recycled water is that it can be done even in times of drought since recycled water is immune from droughts or Delta issues. Recycled water could be used to enhance streams in many areas of the County.

The District is partnering on this study with researchers at Stanford University. The District proposed to augment stream flows on Upper Silver Creek with recycled water during an approximate five-month research period from July through October 2008. Water quality (surface water and upper aquifer groundwater) and water temperature impacts from the release of tertiary-treated recycled water to augment stream flows were the primary issues studied. In accordance with the California Environmental Quality Act (CEQA), a Final Initial Study and Mitigated Negative Declaration (IS/MND) was prepared. The District coordinated with various regulatory and permitting entities to perform this release and study. Three years of baseline stream water quality data and push well groundwater data were monitored and analyzed. Recycled water quality analyses were also performed for almost three hundred chemical constituents. Based on previous Stanford University investigations on the Santa Ana River in Southern California, many chemicals of concern are adequately filtered or degraded by natural stream processes, and recycled water could be a suitable candidate for streamflow augmentation. However, these evaluations are very site specific and natural hydrogeology and other factors play into these analyses.

Current Findings & Decision. Recently, the Stanford researchers brought forth newly published investigations (from other researchers) on perfluorochemicals (PFCs), a group of compounds that can have adverse health effects. PFCs are emerging (newly discovered) contaminants; they are man-made and can come from packaging materials, lubricants, paints, etc. High doses can lead to mortality while lower doses result in blood and liver impacts, immunological problems, carcinogenic potential and behavioral effects. Stanford researchers reviewed the PFC baseline data on the concentrations of perfluorochemicals found in Upper Silver Creek, in Coyote Creek, in the push wells, and in the recycled water. In interpreting and explaining the significance of their results, the Stanford researchers noted that another researcher had recently determined that a concentration of 50 ng/L (described as a threshold level) of a particular PFC, known as PFOS, should not be exceeded in a water body in order to protect the health of birds. Published research at these low concentrations identified avian impacts but not human health impacts. PFOS is not a chemical that is regulated nor does it have established action levels or maximum contaminant levels (MCLs). There are no current federal or state regulatory requirements regarding PFCs or PFOS because these are emerging chemicals of concern. Based on the local data collected, background concentrations of PFOS in Upper Silver Creek and Coyote Creek are currently around 50 ng/L (the published threshold level). No point source has been identified as a contributor. Concentrations of PFOS coming from San Jose's recycled water range from 190 ng/L to 340 ng/L. Therefore, if the stream is augmented with recycled water this summer, concentrations of PFOS will likely be in the 80 to 200 ng/L range, significantly above the level that could affect the water birds in the creek.

In light of these new findings, staff recommended discontinuing the current release of recycled water into Upper Silver Creek and the District has halted this summer's study.

Future. The District is working with the City of San José on the design of an advanced treatment recycled water facility using microfiltration and reverse osmosis membranes and ultraviolet disinfection. When constructed, this facility would enhance the quality of the recycled water so that it is suitable for more uses. Future streamflow augmentation projects with advanced treated SBWR recycled water (advanced treatment is said to remove almost all contaminants) or future streamflow augmentation projects in different stream locations in the county where stream baseline PFC concentrations are lower may still be feasible.



Staff is proposing continued evaluation of the technical and economic feasibility of doing streamflow augmentation with recycled water. For example, during last year's dry spell, there were requests for augmenting certain creeks with recycled water, when there were no other sources of water to maintain habitat for aquatic species. The District is planning on evaluating other feasible creek locations where recycled water can be used successfully for streamflow augmentation. Should future sites be located, hydrological and geographically specific data pertinent to the new site will be required as well as new CEQA documents. Future use of recycled water for long-term stream augmentation will also require additional environmental review.

Pharmaceuticals In Water Supplies

Fact Sheet # 7
Slides 42, 44-46

The Santa Clara Valley Water District has been closely monitoring recent research on the issue of pharmaceuticals finding their way into the nation's water supply. In 2002 and 2003, the District tested its raw water supply for traces of pharmaceuticals. Additionally, as part of the Advanced Treatment Recycled Water Feasibility Study effort in 2001-2003, the District conducted three rounds of sampling for many of these constituents in recycled water.

According to a new Associated Press (AP) study, which was widely reported in recent national and local media, pharmaceuticals—including antibiotics, anti-convulsants, mood stabilizers, and sex hormones—have been found in over 80% of the country's drinking water supplies. Less emphasized in the reporting is that, with improvement in analytical methods, water professionals are now able to measure pharmaceutical and personal care products in the parts-per-trillion range, which is equivalent to 1/20th of a drop of water in an Olympic-size swimming pool. Research throughout the world has not demonstrated an impact on human health from pharmaceuticals and personal care products in drinking water.

In the Water District's testing of source water, only minute amounts of pharmaceuticals were detected. Analyses of recycled water also showed minute amounts of pharmaceuticals in some samples. However, no recycled water is currently used to augment drinking water supplies or influences drinking water in the county.

The U.S. Environmental Protection Agency, which regulates drinking water, maintains an active program called the Contaminant Candidate List (CCL) to identify contaminants in public drinking water that warrant detailed study. The CCL does not currently include any personal care products or pharmaceuticals. Moreover, recent scientific studies on treatment of some of these pharmaceuticals in water found:

- Granular activated carbon (GAC) or powdered activated carbon (PAC) are very effective to remove these compounds through adsorption;
- Chlorine can remove some of the compounds through oxidation;
- Ozone is capable of removing nearly all of the compounds studied through oxidation; and
- Advanced treatment using a membrane system like reverse osmosis is capable of removing nearly all of the compounds.

Public health is of utmost importance to the Water District and the City. The District uses all these treatment technologies, including the advanced water purification technology known as ozonation, for its drinking water supplies. Although no recycled water is currently used for drinking water purposes, the City and the District are planning to advanced treat a portion of the recycled water. In addition, the District just completed construction of a water quality laboratory to ensure that county residents continue to receive water deemed among the most pure and healthy in the country.

Although testing for pharmaceuticals is still in its early stages, the AP study once again underscores the importance of protecting our precious water resources. The Water District and the City will continue to

encourage policies that protect water from contaminants introduced by pesticides, gasoline or industrial products, and will continue to actively address emerging issues, including pharmaceuticals in water. The best and most cost-effective way to ensure safe water at the tap is to keep our source waters clean. The community can assist by following the Office of National Drug Control Policy, which recommends not flushing prescription drugs down the toilet unless the accompanying patient information specifically instructs that it is safe to do so.

Advanced Recycled Water Treatment Facility

Fact Sheet #8
Slides 45-52

An Advanced Recycled Water Treatment (ARWT) Facility project is endorsed by the Silicon Valley Leadership Group as a way to develop a reliable, sustainable water source for Santa Clara County. Such a project aims to improve the quality of recycled water to aggressively protect groundwater basins while sustaining current baseline users and providing opportunities to expand the user base. The water quality target is to reduce salinity from approximately 730 ppm to 500 ppm. Such treatment would also reduce any other contaminants, including emerging constituents of concern, that might be in the water.

ARWT would facilitate future use of recycled water for landscape irrigation in some sensitive areas and potentially increase industrial applications. It would mitigate the salt impacts due to the proposed increases in industrial cooling towers uses and indoor water reuse in new developments. Finally, AWRT would also enhance options to pursue groundwater recharge and reuse in the future.

Figure 1: Reverse osmosis plant at Alameda County Water District works to remove excess minerals.

The preferred ARWT project involves 10-mgd microfiltration, 8-mgd reverse osmosis, and 10-mgd ultraviolet light disinfection treatment at a facility to be constructed right at the San Jose/Santa Clara Water Pollution Control Plant (Treatment Plant). Staff from the District and City has collaborated on the development of this project and the related Draft Engineers Report, which is near completion. The treatment facility capacity, location, preliminary engineering process, expandability, site layout are included in the report. California Environmental Quality Act (CEQA) compliance documents are also being prepared.

Estimated cost. The current total project cost estimate is $53 million. This includes using land owned by the Treatment Plant (worth $2M); costs for engineering and construction management; and accounts for inflation. The District and City anticipate that a recommendation on cost share proposal will result from the negotiation on long term operation and maintenance for South Bay Water Recycling.

In April 2007, the California Department of Water Resources awarded an approximately $3 million state grant to this project. In late 2007, the Water Resources Development Act was enacted and a $5.5 million federal grant was authorized for this project.

Advanced Treatment generally refers to the treatment process that employs the best available technology. Today's best available treatment technology is the use of reverse osmosis in combination with microfiltration and ultraviolet light disinfection.

Microfiltration (MF)
Microfiltration is a low-pressure membrane filtration process that takes small suspended particles, bacteria and other materials out of the water. Microfiltration provides the most efficient preparation of water for reverse osmosis. It is used in commercial industries to process food, fruit juices and soda beverages; in computer chip manufacturing; and to sterilize medicines that cannot be heated.

Reverse Osmosis (RO)
Reverse osmosis is a high-pressure membrane filtration process that forces water through the molecular structure of several sheets of thin plastic membranes to filter out minerals and contaminants, including salts, viruses, pesticides, and other materials. The RO membranes are like microscopic strainers - bacteria and viruses, as well as inorganic and most organic molecules cannot pass through the membranes.

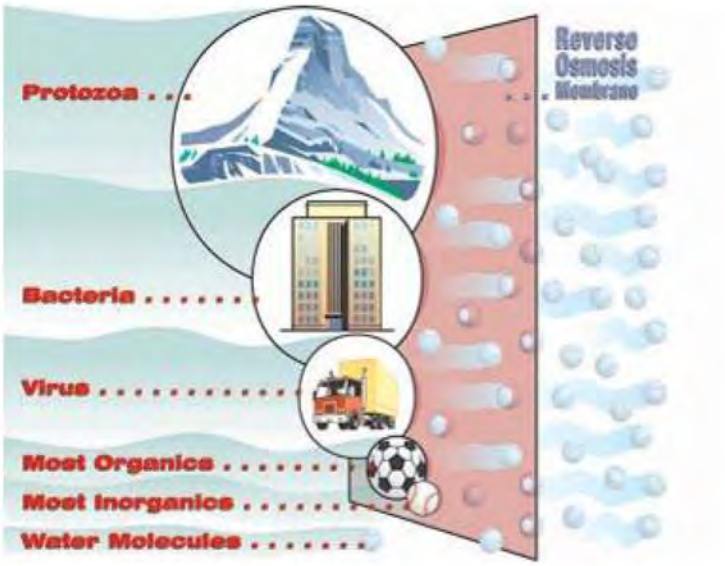


Figure 2: These objects show the relative size of particles that are filtered out by a reverse osmosis membrane compared to a water molecule—shown as the size of a tennis ball. Water molecules are forced under high pressure through the molecular structure of membrane.

Ultraviolet (UV) Light and Hydrogen Peroxide Treatment
During ultraviolet disinfection, water is exposed to ultraviolet (UV) light to provide disinfection. This is the same process used on instruments in medical and dental offices. Additionally, ultraviolet light combined with hydrogen peroxide creates an advanced oxidation reaction that eliminates any remaining contaminants in water by breaking them down in harmless compounds like carbon dioxide and water. This multiple barrier process creates an ultra-pure water.

In July 2002, Singapore announced that it would use microfiltration, reverse osmosis, and ultraviolet light in their NEWater process and as a significant part of its future water plans. Singapore's plan is to use these three processes to treat domestic wastewater before discharging the NEWater into reservoirs to augment drinking water supply. The NEWater plant became its most toured facility, attracting professionals and casual tourists from all over the world. In 2007, the Groundwater Replenishment System in Orange County, CA adopted the same treatment technology in its operations and became the largest groundwater recharge and reuse project in California.

Construction for this project is scheduled to begin in the summer 2009, provided that CEQA clearance is obtained and the District and the City reach a final cost share agreement for the facility. The District and the City are currently joining multiple Bay Area agencies to pursue an additional $8.25 million in federal funding for this project.

Salinity reduction is a key step if the District and the City decide to pursue future groundwater recharge with recycled water. Recycled water use can be expanded to many additional uses by reducing the salinity to 500 ppm but groundwater recharge requires much lower salinity, 30-50 ppm.

The Advanced Treatment Facility would employ the best available technology, similar to that currently being used by the Orange County Water District's Groundwater Replenishment Project which has spent years demonstrating the reliability and safety of advanced treatment, and is already recharging their groundwater basin with recycled water. Operational data from the San Jose Facility would be useful in the future when seeking public acceptance during the application process for securing groundwater recharge permits from the regulatory agencies and seeking public acceptance.

The lead time for implementing a groundwater recharge reuse project is approximately 10 to 15 years. Groundwater recharge reuse projects across the world, including Singapore's NEWater, Orange County's Groundwater Replenishment Project, and Australia's latest reservoir augmentation project, show that gaining public acceptance takes many years and is key to success. Implementing the advanced treatment project in Santa Clara County now would provide tremendous value to gain this public trust and acceptance.

Groundwater Recharge

Fact Sheet #9
Slides 45-46, 51-54

Groundwater recharge occurs when surface water percolates through soil and/or rock to replenish underground aquifers. The land or pond area on the surface, where water infiltrates, is called a recharge zone or recharge area.

Groundwater recharge occurs naturally through:

- Deep percolation of rainfall
- Seepage through streambeds
- Seepage from surrounding hills
- Subsurface flow from adjacent groundwater basins

All the sources listed above contribute to recharge in Santa Clara County. However, natural recharge is not sufficient to replenish the amount of groundwater pumped each year. To ensure a reliable groundwater supply, the District manages an active artificial recharge program.

Artificial recharge is the process where excess surface water is intentionally directed into the ground to increase infiltration and replenish groundwater. The District conducts extensive artificial recharge operations along approximately 70 miles of stream channels and 300 acres of recharge ponds (percolation basins). The District uses local reservoir water and imported water from the Delta, releasing it into streams and percolation ponds, to replenish deep drinking water aquifers. The average annual recharge capacity of these systems is approximately 138,000 acre-feet.

The District's artificial recharge program is critical to ensuring a reliable water supply both now and in the future by:

- Storing water for use during droughts and shortages; and
- Preventing saltwater intrusion and land surface subsidence, both of which are very costly to the community.

In-lieu recharge occurs when surface water is provided for use in areas that would otherwise use groundwater. The District sends the imported water through three water treatment plants to provide drinking water, thus reducing demands on the groundwater basin, and leaving more groundwater in storage for later use. This "conjunctive" use of groundwater and surface water supplies and integrated water supply management approach improves overall water supply reliability and flexibility to meet future water supply conditions.

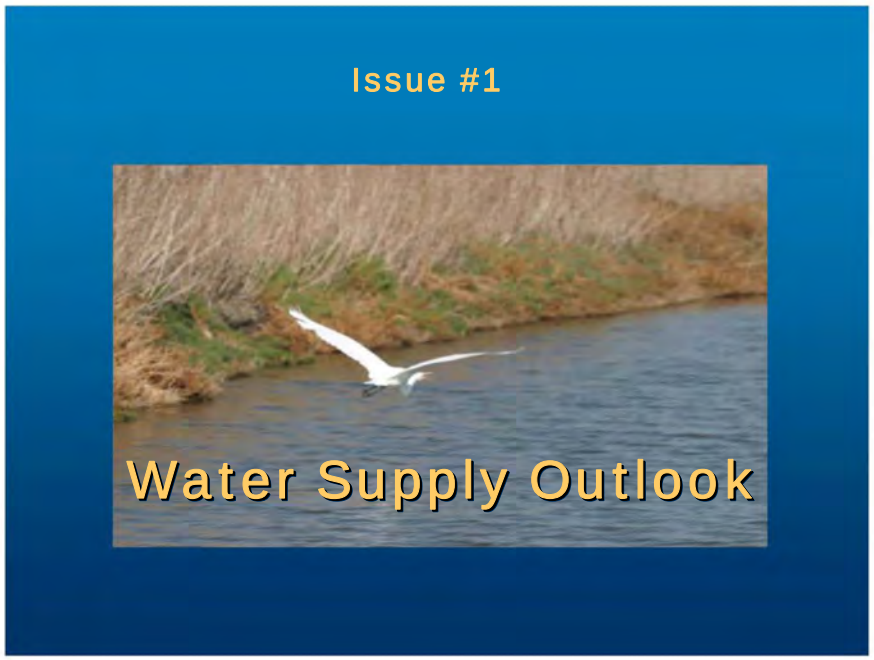
Groundwater recharge reuse refers to artificially recharging groundwater basins with recycled water.

As the demand for water has increased, so has the need to maximize the efficient use of available water supplies. Many agencies, including the District, recognize recycled water as an important component of their long-term water supply strategy. Within Santa Clara County, recycled water is currently used only for non-potable (non-drinking) uses including landscaping, irrigation and industrial uses. Some agencies in southern California and elsewhere around the country and world have implemented groundwater recharge reuse projects, where recycled water is used to augment groundwater supplies or prevent saltwater intrusion. These types of projects have stringent regulatory requirements with lengthy approval processes but supply critically needed water to maintain local economic development. The recycled water used for these types of projects is usually advanced treated with the best available treatment technologies such as reverse osmosis. Given the increasing costs of moving and treating water, groundwater recharge reuse is inarguably the most cost effective way to implement a large scale water recycling program.

Before the District can implement reuse through groundwater recharge, there are regulatory, institutional, and public perception issues that must be addressed. Gaining public acceptance will require a multi-year public outreach effort and extensive collaboration between the District and South Bay cities. Getting appropriate permits from the Department of Public Health and the Regional Water Quality Control Boards would also be a lengthy process. Implementing the Advanced Recycled Water Treatment facility and thereby reducing the salinity of the recycled water will be an important step in gaining public acceptance and the appropriate permits from regulatory agencies. District staff has prepared a budget proposal for a project to investigate the following issues related to groundwater recharge reuse in 2008-09:

- Regulatory issues related to protection of the groundwater basins– Getting appropriate permits from the Department of Public Health and the Regional Water Quality Control Boards.

- Institutional issues – Identifying and resolving water rights issues and the necessary changes in the operation of existing facilities and/or the development of new facilities.



Key Points and Fact Sheets

1.

- Format for the water supply discussion divided into three main areas, and water conservation and recycled water are key components.

2.

- Issue No. 1 is the Water Supply Outlook

3.

- Water supply in this County comes from many sources.

4.

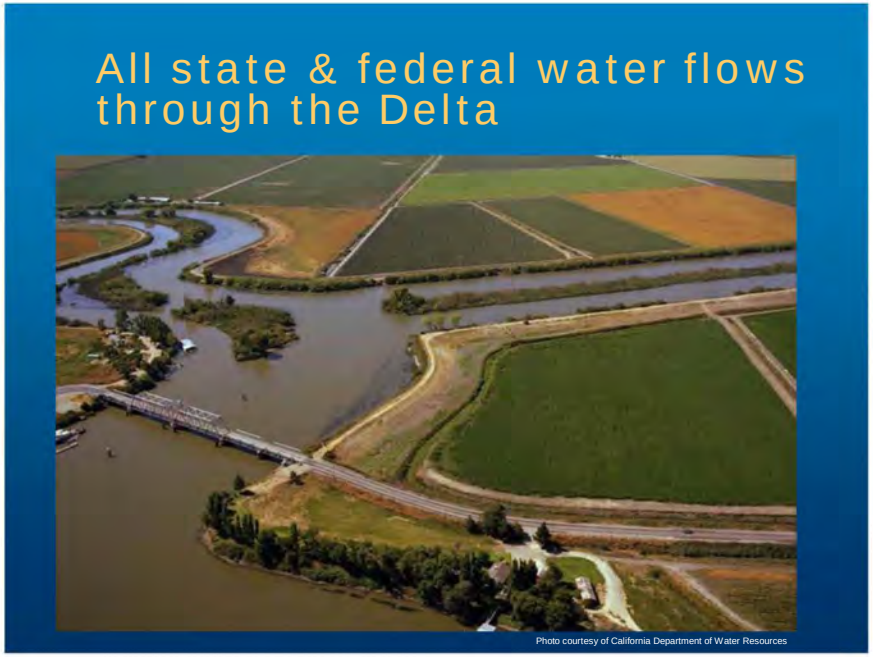
- Water imported into this County comes from three systems, the first of which is the State Water Project system.

5.

- The second imported water source is from the Federal Central Valley Project system.

6.

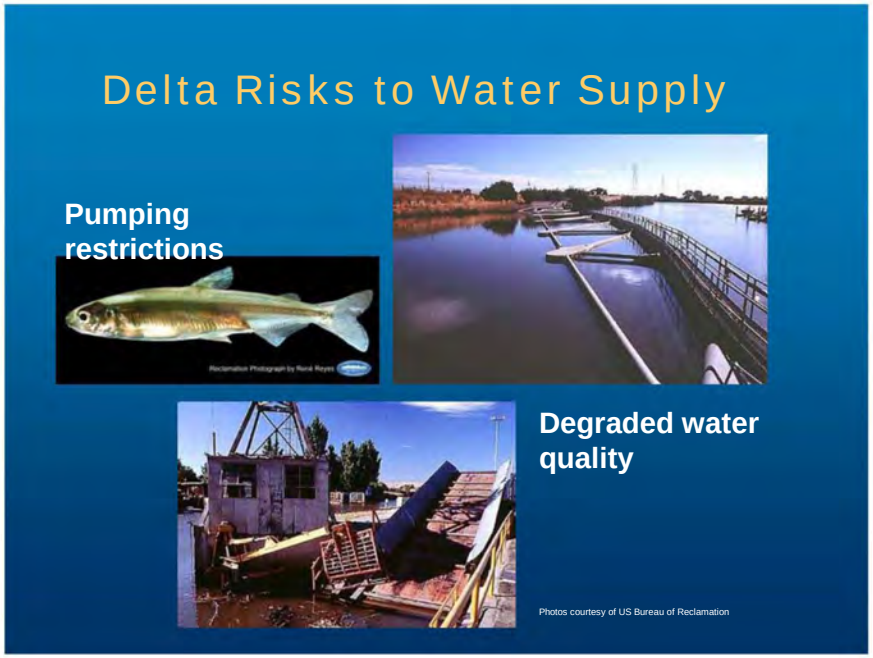
- The 3rd imported water source is the Hetch Hetchy Pipeline system owned and operated by SFPUC



7.

- State and Federal imported water flows through the Sacramento San Joaquin Delta system.

Fact Sheet:
2 – Water Supply Reliability



8.

- Delta water comes with its own risks, including the recent “regulatory drought” with the Smelt issue.

Fact Sheet:
2 – Water Supply Reliability

9.

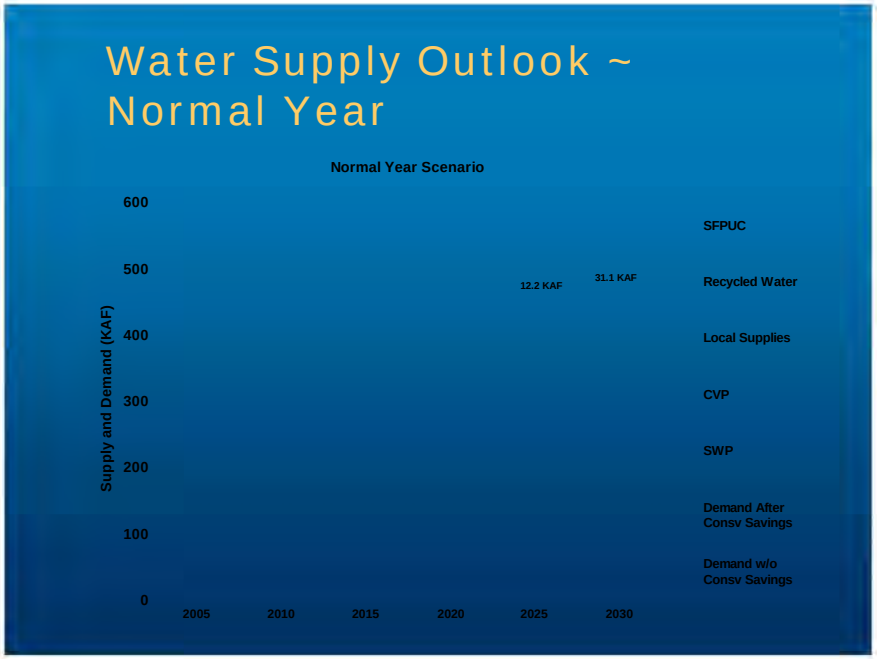
- Earthquakes and old and fragile levees can impact our imported Delta water.

Fact Sheet:
2 – Water Supply Reliability

10.

- The aging infrastructure will need to be replaced.

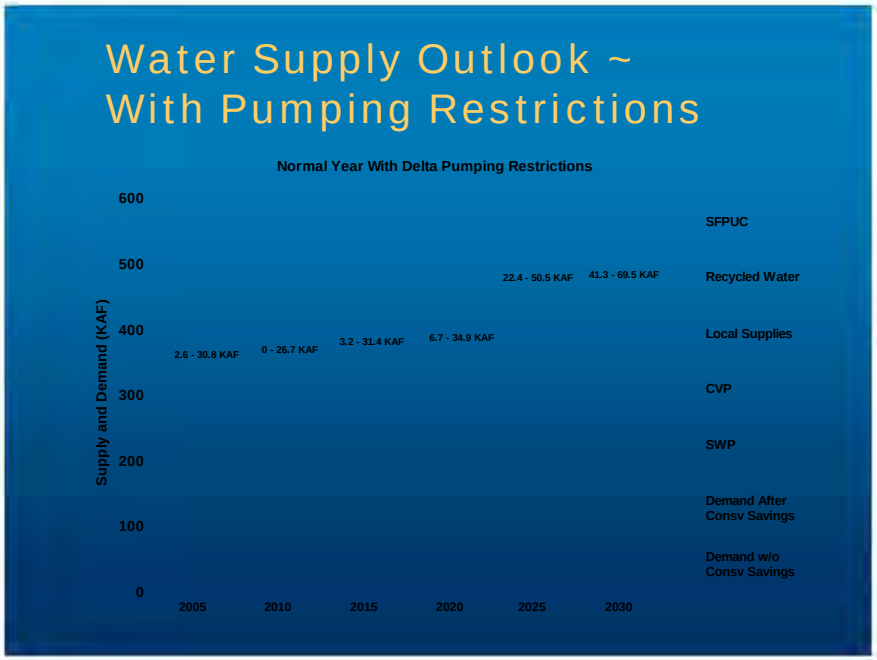
Fact Sheet:
2 – Water Supply Reliability



11.

- Even with normal precipitation, a shortfall is predicted after 2020.
- Conservation reduces the total water demand.

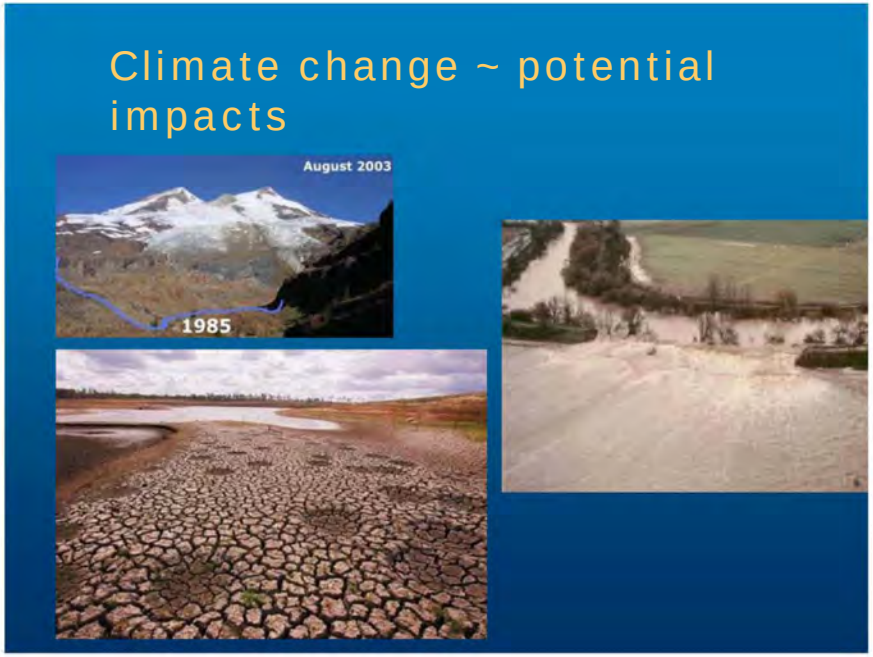
Fact Sheets:
1 – How We Measure Water
2 – Water Supply Reliability



12.

- Delta pumping restrictions would increase the shortfall.

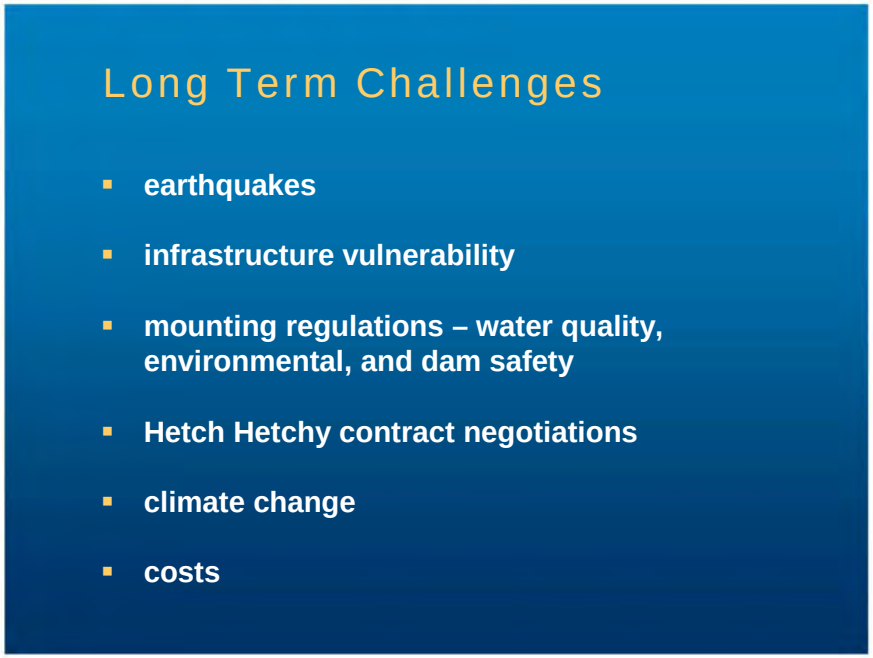
Fact Sheets:
1 – How We Measure Water
2 – Water Supply Reliability



13.

- Climate change will decrease available water.

Fact Sheets:
2 – Water Supply Reliability
3 – Global Warming



14.

- Future water supply will be scarce and expensive

Fact Sheet:
2 – Water Supply Reliability
3 – Global Warming

ACTIONS we should take today

- **Asset Management**
- **Public education**
- **10% voluntary conservation**
- **Expand recycled water**
- **Contingency plans**
- **Water banking**
- **Optimize system operations**
- **Support Delta capital projects** **(e.g. State Water Bond)**

15.

- Many actions should be taken today to alleviate water supply shortfalls, for example, having voluntary conservation

Fact Sheet:
2 – Water Supply Reliability

State Water Bond

GOVERNOR'S PROPOSAL:

Potential grants for Water Conservation, Water Recycling and other water supply projects

Status: stalled

NEW WATER BOND (MACHADO) PROPOSAL:

Potential grants for Delta fix, water supply and water use efficiency

Status: introduced March 2008 to re-start negotiations

16. Both agencies need to work together to support legislation for a State Water Bond.

Fact Sheet:
2 – Water Supply Reliability

Climate Change Response
AB 32 Global Warming Solutions Act

- **Reduce greenhouse gases to 1990 levels by 2020**
- **City & District to quantify greenhouse gas emissions for water supply**

17.

- AB 32 will affect our water business significantly.

Fact Sheet:
2 – Water Supply Reliability

Ongoing priorities & focus

- **Public education**
- **Increase water use efficiency**
- **Continue investment in local resources**
- **Advocate for pertinent legislation and Delta solutions**
- **Increase regional coordination**
- **Coordinate on land use decisions related to Water Supply Assessments**

18.

- Here are the areas we are currently investing in and supporting to secure our water supplies

Fact Sheet:
2 – Water Supply Reliability

Where should we focus for the long-term?

- **Protect existing supplies and infrastructure (Baseline**
- **Solve Delta problems**
- **Advocate for a "smarter" water delivery system**
- **Continue investment in local resources**
- **Increase water use efficiency**
- **Advocate for pertinent legislation**
- **Increase regional coordination**

19.

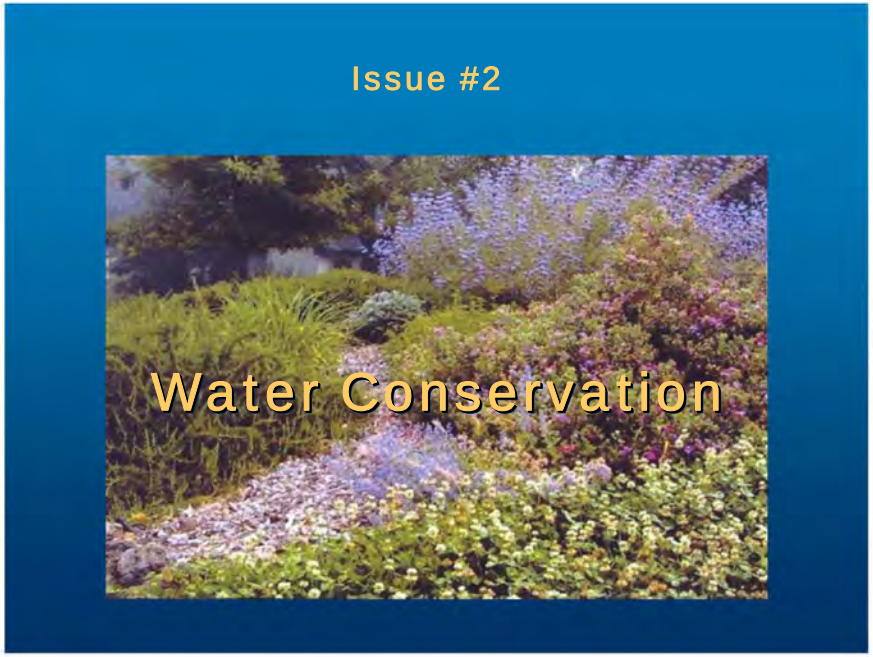
- Here are the areas we should invest in and support to sustain our water supplies in the long term

Issue #2

Anderson Reservoir in year four of 1987-1992 drought

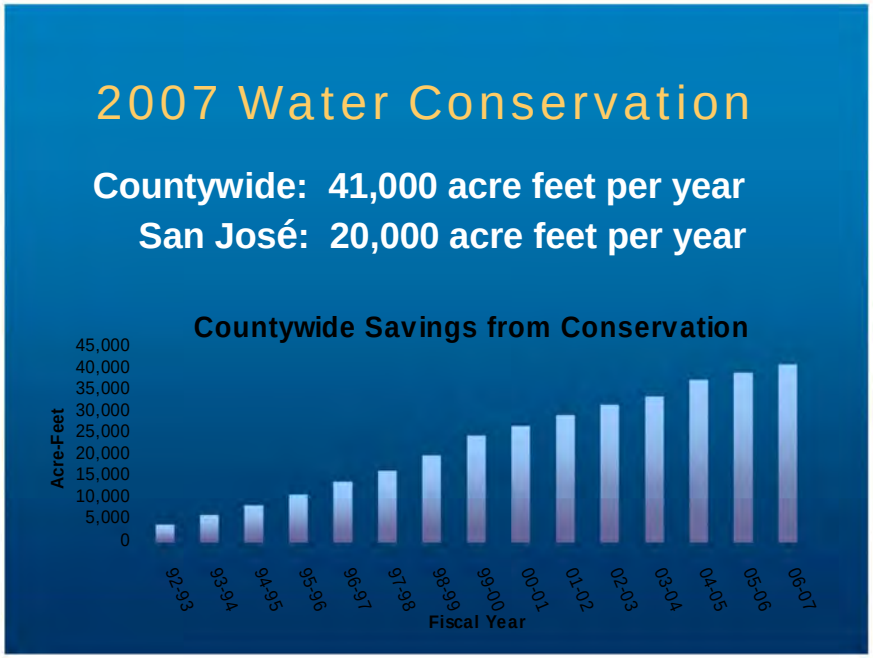
20.

- Anderson Reservoir in year 4 of the 1987-1992 drought



21.

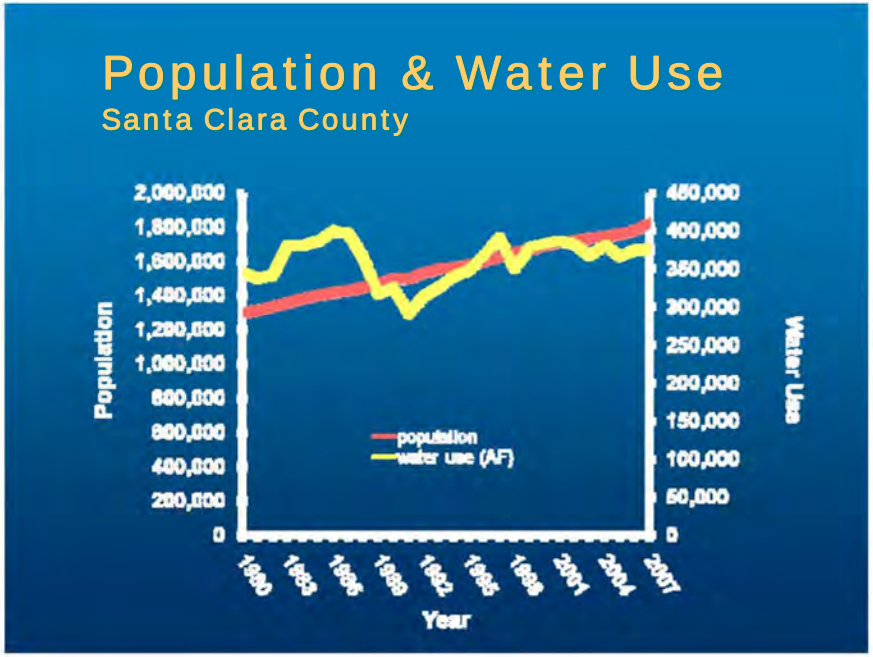
- Garden landscaped with low water use plants



22.

- We've made significant progress in water conservation, saving 41,000 af/yr in 2007

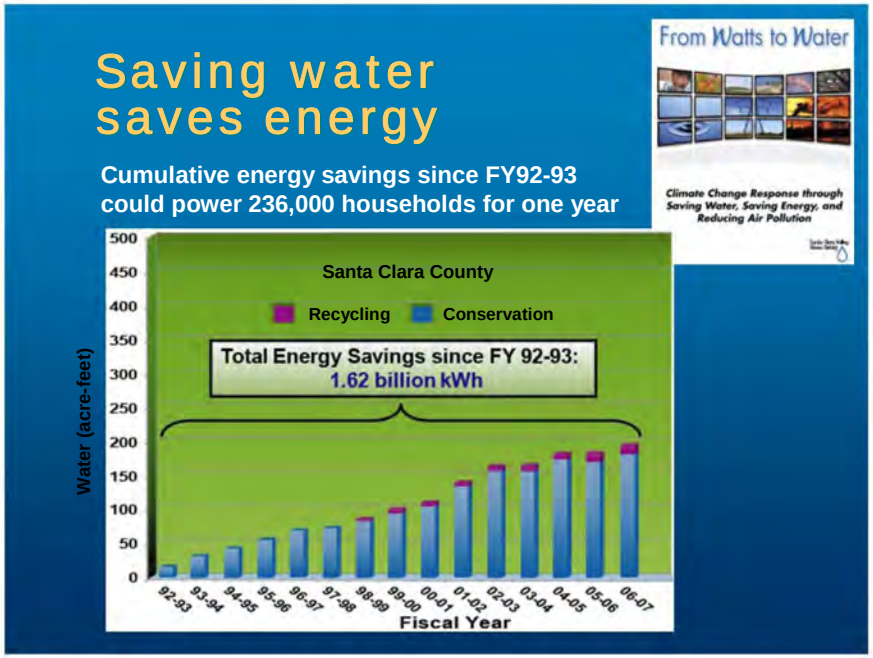
Fact Sheets:
1 – How We Measure Water
4 – Conservation



23.

- Although population has continued to increase, water use has remained fairly constant over the last 10 years and is still below pre-drought levels.

Fact Sheets:
1 – How We Measure Water
4 – Conservation



24.

- There are multiple benefits to conserving water, including reducing impacts of global climate change

Fact Sheet:
4 - Conservation

Water Conservation Goals

Long Term Target (by 2030)

acre-feet per year

- **100,000 countywide**
- **50,000 in San José**

25.

- Even though we've been successful in water conservation, still have a long way to go to reach our aggressive long-term goal

Fact Sheets:
1 – How We Measure Water
4 – Conservation

Conservation Program Overview

- **10 Residential programs**
- **10 Commercial programs**
- **2 Agricultural programs**

US EPA Award in 2007

EPA WATER EFFICIENCY LEADER AWARD

26.

- Currently offering a variety of programs

Fact Sheet:
4 – Conservation

27.

- Examples of Residential Water Conservation Programs

Fact Sheet:
4 – Conservation

28.

- Examples of Commercial Water Conservation Programs

Fact Sheet:
4 – Conservation

Conservation Programs ~ Agricultural

Mobile Lab for Irrigation Efficiency

California Irrigation Management Information System

29.

- Examples of Agricultural Water Conservation Programs

Fact Sheet:
4 – Conservation

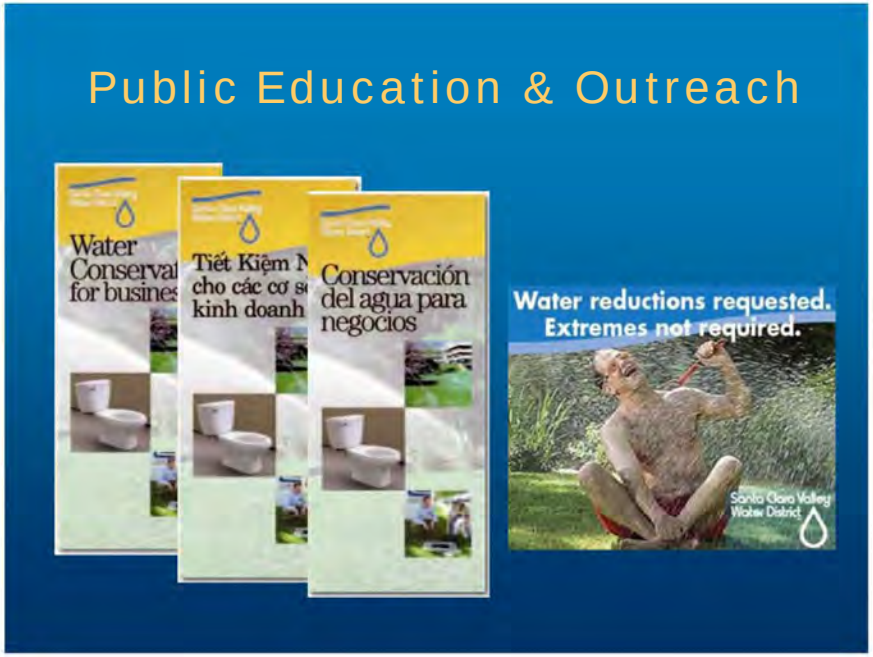
Possible Policies & Ordinances

- **New landscape ordinance by 2010**
- **Revised building design guidelines**
- **Retrofit on Resale, Water Demand Mitigation and other ordinances being considered**

30.

- Adopting and enforcing ordinances is a cost-effective approach to reaching the aggressive long-term goals

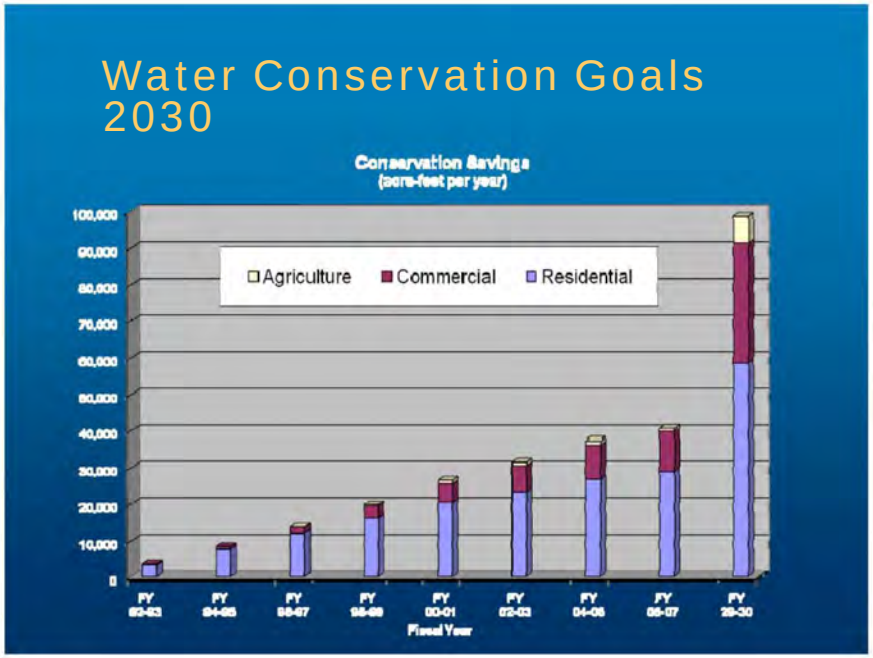
Fact Sheet:
4 – Conservation



31.

- Water conservation programs will not be successful without significant public outreach/education

Fact Sheet:
4 – Conservation



32.

- Again, still have a long way to go to reach our aggressive long-term goals.

Fact Sheets:
1 – How We Measure Water
4 – Conservation

Priorities to Achieve Our Conservation Goals

- **Expand outreach/education**
- **Continue existing programs**
- **Support new water efficient technologies**
- **Adopt water efficiency policies and ordinances**
- **Secure funding**

33.

- Need to work together to reach these goals

Fact Sheet:
4 – Conservation

Issue #3

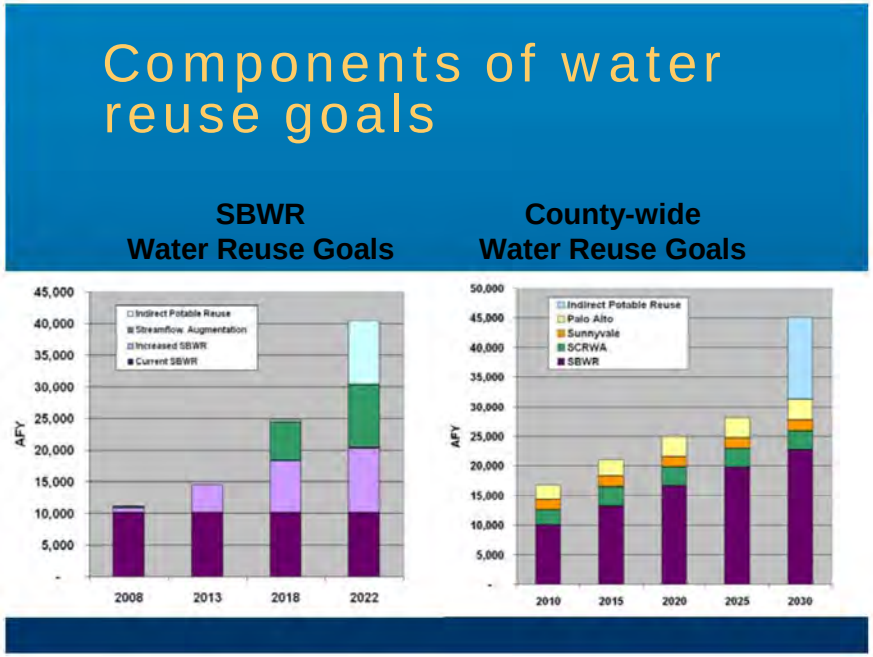
34.

- The 3rd issue is on recycled water.

35.

- The City's Green Vision goal for recycled water is in alignment with the District's Policies for recycled water.

Fact Sheet:
5 – A Shared Vision for Recycled Water



36.

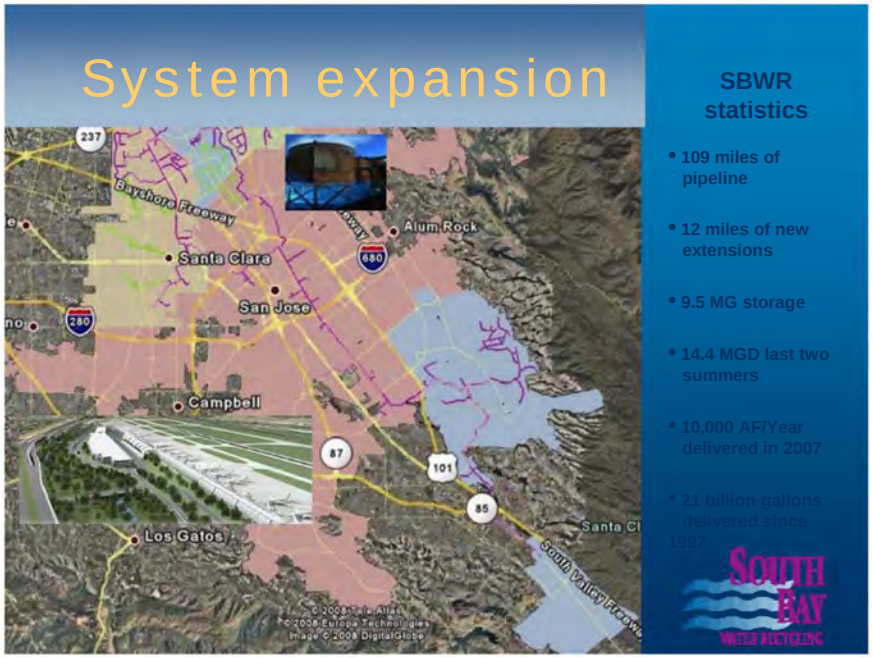
- The District 10% ends policy target for future recycled water used meshes with the City's Green Vision recycled water goal.

Fact Sheet:
5 – A Shared Vision for Recycled Water

37.

- Current South Bay recycled water outlook

Fact Sheet:
5 – A Shared Vision for Recycled Water



38.

- Map of the current South Bay recycled water system and potential future expansion (green lines).

Fact Sheet:
5 – A Shared Vision for Recycled Water

39.

- Recycled water can be used for many purposes other than landscape irrigation, including a variety of commercial and industrial uses.

Fact Sheet:
5 – A Shared Vision for Recycled Water

40.

- Community Outreach is vital for expanding recycled water use. For example, gardeners at the new Guadalupe River Park & Gardens Community Gardens will have the opportunity to grow vegetables with recycled water in an innovative project, jointly funded by the City of San José, the GRPG and the WateReuse Foundation.

Fact Sheet:
5 – A Shared Vision for Recycled Water

41.

- If the salinity in the recycled water is adequately managed, recycled water can be used in more places and for more uses.

Fact Sheet:
5 – A Shared Vision for Recycled Water

42.

- The agencies are evaluating using recycled water for stream flow augmentation – both for an environmental benefit, and a water supply benefit.

Fact Sheets:
5 – A Shared Vision for Recycled Water
6 – Stream Flow Augmentation
7 – Pharmaceuticals

Rates, ordinances & fees

- **Developer funding of pipeline extensions and system improvements**
- **Dual-plumbing & cooling use for developments**
- **Set rates to maintain fiscal health and encourage recycled water use**

43.

- There are a number of sources for funding recycled water expansion.

Fact Sheet:
5 – A Shared Vision for Recycled Water

Prior direction from Board & Council

2003

- **Identify opportunities and costs for improved water quality to maximize recycled water uses**

2006

- **Identify opportunities for Groundwater Recharge Reuse (GWRR)**
- **Develop long term recycled water partnership agreement**

2007

- **Form Joint District/TPAC/Council Committee**

44.

- The Board and Council have supported expansion of recycled water and improving recycled water quality.

Fact Sheet:
5 – A Shared Vision for Recycled Water
7 – Pharmaceuticals

Greater usability, reliability with advanced treatment

ARWT = Advanced Recycled Water Treatment

- **Reduced salinity, chemicals enables expanded uses of recycled water**
- **Demonstrate reliability of ARWT**
- **Evaluate brine removal for groundwater recharge**
- **Joint funding (district, city, private & public grants)**

45.

- There are many benefits to advanced treating recycled water.

Fact Sheets:
5 – A Shared Vision for Recycled Water
7 – Pharmaceuticals
8 – Advanced Recycled Water Treatment Facility
9 – Groundwater Recharge

Why should we build ARWT now?

Resulting better quality water will …

- Expand uses of recycled water
- Enable stream flow augmentation
- Give us a headstart on 10-15 years needed for groundwater recharge projects

46.

- There are solid reasons to build the Advanced Treatment Facility now and not wait for the future.

Fact Sheets:
5 – A Shared Vision for Recycled Water
7 – Pharmaceuticals
8 – Advanced Recycled Water Treatment Facility
9 – Groundwater Recharge

ARWT potential funding

Date	Size	Planning, CEQA & Design Costs	Construction Costs	Potential Funding Sources
2007/08	MF 10 MGD RO 8 MGD UV 10 MGD	$3.68M	$49M	• $13M City • $3M state grant • $5.5M WRDA • $8.25M federal* • Explore potential development fees

Note: *Federal grant (Miller Bill) passed the house and is scheduled for Senate hearing

47.

- Both agencies are seeking to secure financial grants and assistance to build this facility.
- Plant to contribute $13M
- District to fund the balance upfront
- both agencies are also seeking state and federal grants which will be used to offset the District's up front contribution

Fact Sheets:
5 – A Shared Vision for Recycled Water
8 – Advanced Recycled Water Treatment Facility

Proposed ARWT site

48.

- The Advanced Recycled Water Treatment facility will be located next to the gateway to the San Jose/Santa Clara's Water Pollution Control Plant.

Fact Sheets:
5 – A Shared Vision for Recycled Water
8 – Advanced Recycled Water Treatment Facility

49.

- A long-term recycled water relationship is necessary

Fact Sheet:
5 – A Shared Vision for Recycled Water

50.

- Elected officials from both agencies will work together to create and forge a long-term agreement.

Fact Sheet:
5 – A Shared Vision for Recycled Water

Increased public support for indirect potable reuse

- **San Diego: reservoir augmentation**
- **OCWD: groundwater recharge**
- **Gwynette County, Georgia: reservoir augmentation**
- **Singapore: high-purity industrial and reservoir augmentation**
- **Queensland (Brisbane area): industrial use and reservoir augmentation**

51.

- Getting public to accept the safety of recycled water is key/vital for indirect potable reuse.

Fact Sheets:
5 – A Shared Vision for Recycled Water
9 – Groundwater Recharge

Groundwater Replenishment Project (Orange County Water District)

World's largest potable reuse facility purifies water with …

- microfiltration
- reverse osmosis
- UV disinfection

Produces 70 million gallons daily for groundwater recharge

52.

- Using recycled water for Indirect Potable Reuse has been successful both in the US and worldwide.

Fact Sheets:
5 – A Shared Vision for Recycled Water
9 – Groundwater Recharge

Community Recycled Water Task Force

Will help to ~

- **increase public participation**
- **build support for expanded uses**
- **explore indirect potable recharge**

53.

- A Community Task Force will improve public acceptance

Fact Sheets:
5 – A Shared Vision for Recycled Water
9 – Groundwater Recharge

Priorities for next steps?

- **Policy on indirect recharge reuse**
- **Stream flow augmentation**
- **Recycled water long term agreement (using ad hoc Joint Advisory Committee)**

Santa Clara Valley Water District

54.

- Possible next steps to expand use of recycled water