

# SEWER AND WATER INFRASTRUCTURE REPORT

*OC LAFCO October 2011*



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## **EXECUTIVE SUMMARY**

In August 2010, the Commission directed staff to work with California State University, Fullerton to prepare an analysis of sewer and water infrastructure and the projected impacts that population growth may have on the existing systems. This report represents the analysis and findings of the Commission's effort over the past year.

Key determinations:

- Projected countywide demand affects both the water and sewer infrastructure at the same rate;
- Projected water and sewer demands coincide with known developments across the county;
- Legislative and regulatory actions are proactively reducing water and sewer demands on the existing infrastructure;
- OC currently has over 2,600 active septic tanks located throughout the County;
- OC agencies are using innovative approaches to water supply management and are actively pursuing reduction of reliance imported water supplies which are increasingly unreliable;
- OC sewer and water infrastructure is ready for the projected population growth and resulting increases in net demand for the next 20 year period between 2010 and 2030;
- Additionally, Orange County agencies have collaborated on multiple hazard mitigation plans to protect the County's infrastructure from the impacts of natural disasters.

## INTRODUCTION

Orange County's population is projected to increase by 400,000 to 3.6 million by 2030.

### **Hot Topics:**

*Are all the water and sewer agencies ready for the increase?*

*How will OC's infrastructure survive or weather the impacts of the projected population increases?*

Orange County LAFCO has a State mandate to identify the present and planned capacity of public facilities and the growth and population projections for the affected area.<sup>1</sup> This report provides a discussion of the impacts of population growth on Orange County's water and sewer infrastructure and capacity. The report is the result of water, sewer and demographic data collected across multiple agencies including South Orange County Wastewater Authority, Orange County Transportation Authority, Orange County Sanitation District, Municipal Water District of Orange County, and the California State University, Fullerton. The collaboration has led to the development of countywide demographic data revealing the shifts in demand for water and sewer from 2010 to 2030.

Additionally, the Commission requested information on the potential impacts of natural disasters on the County's infrastructure. The growth in population may be predicted, but no one can predict occurrence of the next natural disaster. In March of this year, a major earthquake devastated northern Japan and a resulting tsunami hit the Country's eastern coast. This event caused massive damage to Japan's infrastructure and created a health and safety crisis. This tragic event reminded us of how vulnerable Southern California is to a natural disaster. There is no way to prevent catastrophic events from occurring; the best thing to do is be prepared - Orange County is once again a leader with multiple collaborations and hazard mitigation plans in place. As a result, the report includes a section on Natural Disaster Preparedness.

The County's infrastructure is prepared for the upcoming demand from future residents and the report highlights that service providers have procedures in place to ensure the infrastructure demands are met.

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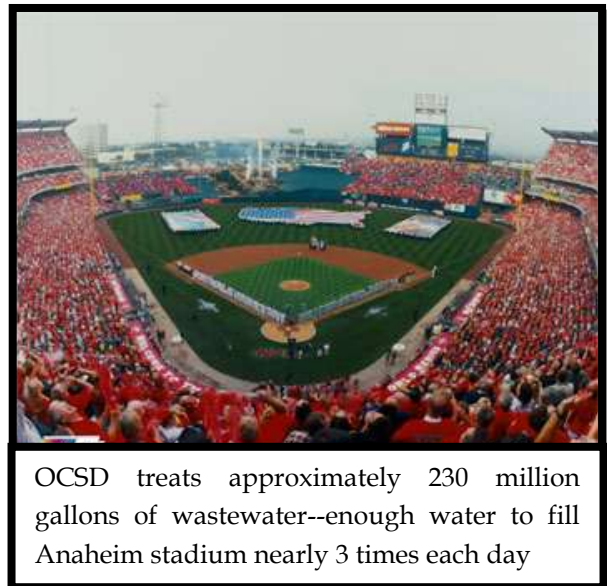
<sup>1</sup> Government Code Section 56430(a(1,2))

## SEWER INFRASTRUCTURE & POPULATION GROWTH ANALYSIS

Orange County has over 30 local sanitary sewer agencies and two regional sanitation agencies providing services to 3.2 million residents. These agencies include cities, small single purpose districts, and multipurpose agencies (providing sewer and water). The following discussion will review regional sanitation, local sewers and onsite wastewater treatment systems, and will analyze countywide findings of how the projected population will impact those systems over the next 20 years.

### Regional Sanitation – A Tale of Two Systems

Orange County's two regional sanitation service providers are the Orange County Sanitation District (OCSD) and the South Orange County Wastewater Authority (SOCWA). Both agencies provide regional collection and treatment of wastewater within their respective service boundaries. While they provide similar services to their respective regions, they operate under different governance structures. OCSD is a special district and is under the purview of LAFCO, while SOCWA is a joint powers authority (JPA) and not presently under LAFCO jurisdiction. OCSD serves 25 agencies in north and central Orange County (approximately 2.5 million residents). SOCWA represents ten water and sewer agencies in South Orange County serving approximately 800,000 residents.



### Orange County Sanitation District – North Orange County

As the third largest sewer agency in the country, OCSD is responsible for over 230 million gallons of wastewater each day. OCSD as we know it today was formed from multiple county sanitation districts providing services as the County developed. As a result, OCSD inherited a variety of sewer infrastructures, some older than others. A breakdown of the District's sewer pipeline

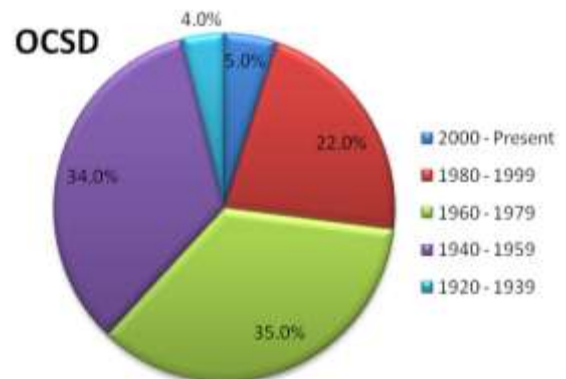


Figure 1: Sewer Pipe Age - OCSD

ages are shown in **Figure 1**.<sup>2</sup> Over 60% of the District's pipes are less than 50 years old.

In order to properly maintain the infrastructure, OCSD prepares strategic plans every five years. As part of their 2006 Strategic Plan, OCSD developed geographic information systems (GIS) data in collaboration with Cal State Fullerton's Center for Demographic Research (CDR) using the agency's 2004 population projections. LAFCO partnered with OCSD to project sewer demand and conditions using GIS data that was produced by a hydraulic modeling program designed to analyze the District's infrastructure capacity. The OCSD service area was broken into sections known as "sewer sheds."<sup>3</sup>



Figure 2: OCSD Member Agencies

The sewer shed data was used to create the map (see **Figure 3**) depicting the correlation between population projections and sewer demand.

The map provides a glimpse of how the change in population will affect sewer demand over the next 20 years (2010-2030).<sup>4</sup> In **Figure 3**, areas of high population growth are depicted in crosshatch and sewer demand levels are depicted in white, yellow and red. The white areas show no projected demand, the areas of slight growth are shown in yellow, and the areas of high growth projections are depicted in red. Additionally, the areas depicted in red with crosshatch indicate correlation between projected increases in population growth and increases in sewer demand.

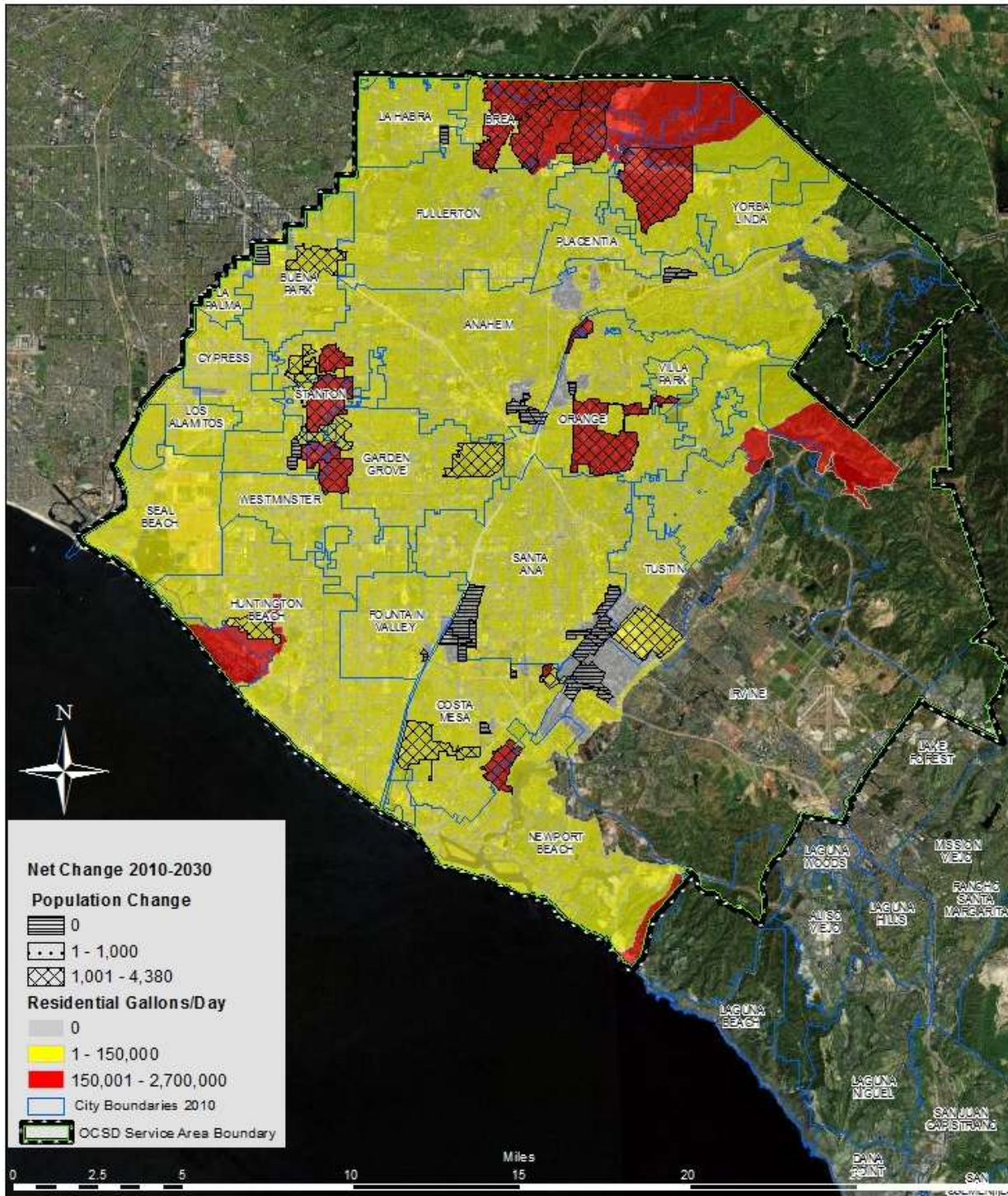
<sup>2</sup> Data Source: State Water Resources Control Board

<sup>3</sup> Sewer sheds refer to geographic units created as a product of OCSD's hydraulic modeling program which are based on the location of regional trunk and lateral sewer lines and sewer flows. The OCSD sewer sheds were used to create the map depicted in Figure 2.

<sup>4</sup> In terms of residential gallons per capita per day.

## OCSD Sewer Sheds Vicinity Map

Correlation of Population Projections and Residential Sewer Demand 2010-2030



Data Shown by Sewer Sheds  
Source: Sewer data provided by OCSD from the 2006 Strategic Plan Update  
Base Map: provided by Bing Maps aerial hybrid photo

Figure 3: OCSD Sewer Sheds Map



The highest areas of growth reflect pending residential developments such as the Tustin Legacy (Former Tustin Marine Air Station), Vista del Verde (Yorba Linda), and the Tonner Hills project (Brea). It should be noted that the sewer sheds vary in geographic size and do not conform to the service boundaries of local agencies. Therefore, the sewer sheds may depict projections for areas where there is no anticipated growth, such as in Chino Hills State Park.

The hydraulic model allowed OCSD to determine deficiencies in the agency's regional pipelines. Their aging infrastructure required additional calculation of various factors when assessing sewer capacity. Flow factors, including base infiltration/inflow from deteriorating pipes, high groundwater infiltrating the system, or flow entering through manholes, have a more significant impact on the capacity of older systems and were included in the OCSD hydraulic model. Other sewer agencies are now implementing this sophisticated form of monitoring when planning and projecting sewer usage for future development projects.

### South Orange County Wastewater Authority

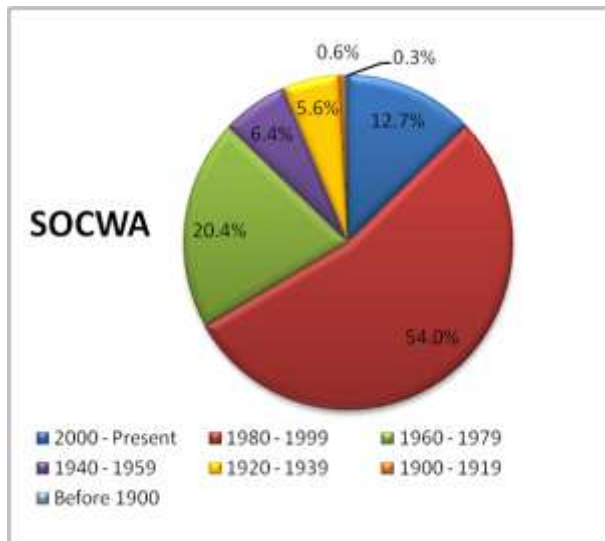


Figure 4: Sewer Pipe Age - SOCWA Agencies

South County, with the exception of the City of San Juan Capistrano, has newer systems when compared to OCSD's infrastructure. **Figure 5** depicts the age breakdowns for the pipelines of the SOCWA member agencies.<sup>5</sup> Less than 15% of the regional infrastructure is greater than 50 years old. The region has four treatment facilities owned and/or operated by SOCWA, which provides regional collection and treatment to approximately one third of the County's population. SOCWA has ten member agencies which include two cities, seven water districts, and a community services

district (See **Figure 4**). The seven water districts in SOCWA provide sewer and water service to their customers. Each agency is required to develop an Urban Water Management Plan (UWMP) every five years, which includes an assessment of its

<sup>5</sup> Data Source: State Water Resources Control Board

present and projected water and sewer infrastructure. UWMPs are discussed in more detail in the Water Infrastructure section of this report (see Page 16).

Based on the recently released UWMPs, the SOCWA member agencies are not anticipating substantial population growth within their service area. Long term development proposals, such as the “Ranch Plan” in South County have been analyzed for impacts to the system.<sup>6</sup> Currently, there are no large scale redevelopments or infill development projects in the planning



Figure 5: SOCWA Member Agencies

pipeline that would significantly impact the sewer infrastructure in South Orange

County. SOCWA’s 2010 Ten-Year Plan is primarily focused on maintenance of existing infrastructure and new projects resulting from additional regulations from the Regional Water Quality Control Board. With the exception of the Ranch Plan, the majority of the open land remaining in South County is designated as either a Natural Community Conservation Plan (NCCP) reserve, a critical habitat or has topology deemed unbuildable.

### Local Sewer Systems

At the local level, cities and special districts require the assessment of local sewer systems and their capacity as part of the normal planning approval process. Proposals for new developments, requesting connection to an existing sewer line, or increased capacity are all required to assess the impacts of the proposal and improve the infrastructure as necessary. If the project is deemed adequate, the member agency will forward the proposal to OCSD or SOCWA to make the final assessment of the project’s impact on the regional infrastructure. Local sewer agencies are also required to produce Sewer Master Plans every five years, which includes an agency-wide infrastructure assessment.

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<sup>6</sup> The “Ranch Plan” is a planned development consisting of 14,000 homes on 23,000 acres of land in South Orange County east of Ladera Ranch and north of San Clemente.

## Orange County Septic Systems

Even though Orange County is a sophisticated urban environment, portions of the County have not connected to sewer systems. This section of the report discusses the government policies driving the conversion of septic systems to sewer systems, the current state of septic systems in the OC, and an assessment of the projected impact to sewer systems should all septic systems convert to sewer.

Septic systems were the first form of sewer control in Orange County. As suburban and agricultural communities thrived in the first half of the 20<sup>th</sup> century, many areas were not in close proximity to the developing sewer infrastructure. Over time, many of these communities began to have access to improved municipal services, but some residents continued to use septic tanks. As a result, pockets of septic systems are found throughout the County.

### Septic Conversion Policies

Federal, State, and local policies are driving the conversion of the septic tanks to sanitary sewer systems. While properly functioning septic tanks can be an effective low-cost method for wastewater treatment in low-density areas, they can also become a serious threat to public health and the environment, especially to surrounding surface water and groundwater.

Nationally, leaking septic systems are a major pollution source in groundwater and have been identified as the third most common source of groundwater contamination by the US Environmental Protection Agency. Contamination of groundwater is typically due to improper maintenance of the septic systems by the homeowners. A report conducted by Orange County in 2003 indicated the County did not have significant contamination due primarily to the County's ongoing prevention plans.

To prevent an increase in septic tanks, all new developments within 150 feet of a local sewer system must connect to the sewer system. Recent revisions to health codes also require local health departments to order an abatement of septic systems not



functioning properly and declare them public nuisances. Also, the California Building Code restricts issuance of a construction or repair permit for a septic system if a public sewer is within 200 feet of a sewer line.

Additionally, legislation was in 2011 (AB741) authorizing public wastewater agencies to offer assistance in the construction of the infrastructure necessary to connect to the public sewer system. The request must come from the property owner and the cost of construction would be a private lien on the property amortized over 30 years. According to industry experts, this new financing option for property owners will encourage conversions which can cost up to \$14,000.

### Septic System Inventory

LAFCO worked with OC Public Works to update the 2003 countywide inventory of septic systems. The map on the following page (Figure 7) illustrates all active septic systems in the County.<sup>7</sup> As shown in Figure 6, the majority of active septic systems are located in Yorba Linda, Orange, San Juan Capistrano, Rancho Santa Margarita, and unincorporated North Tustin.

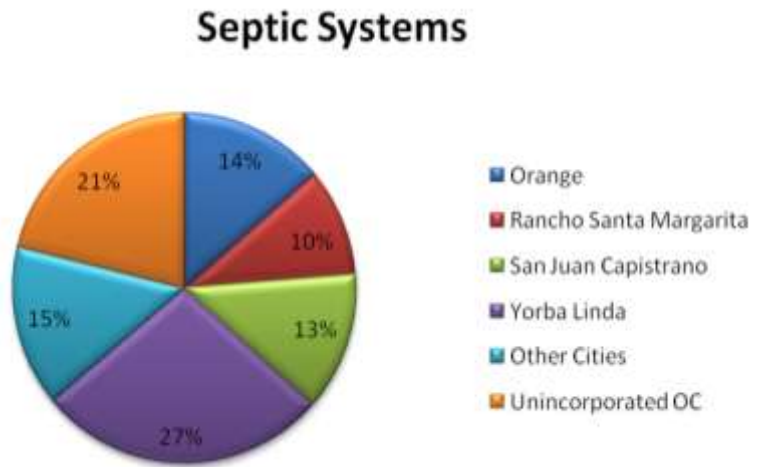
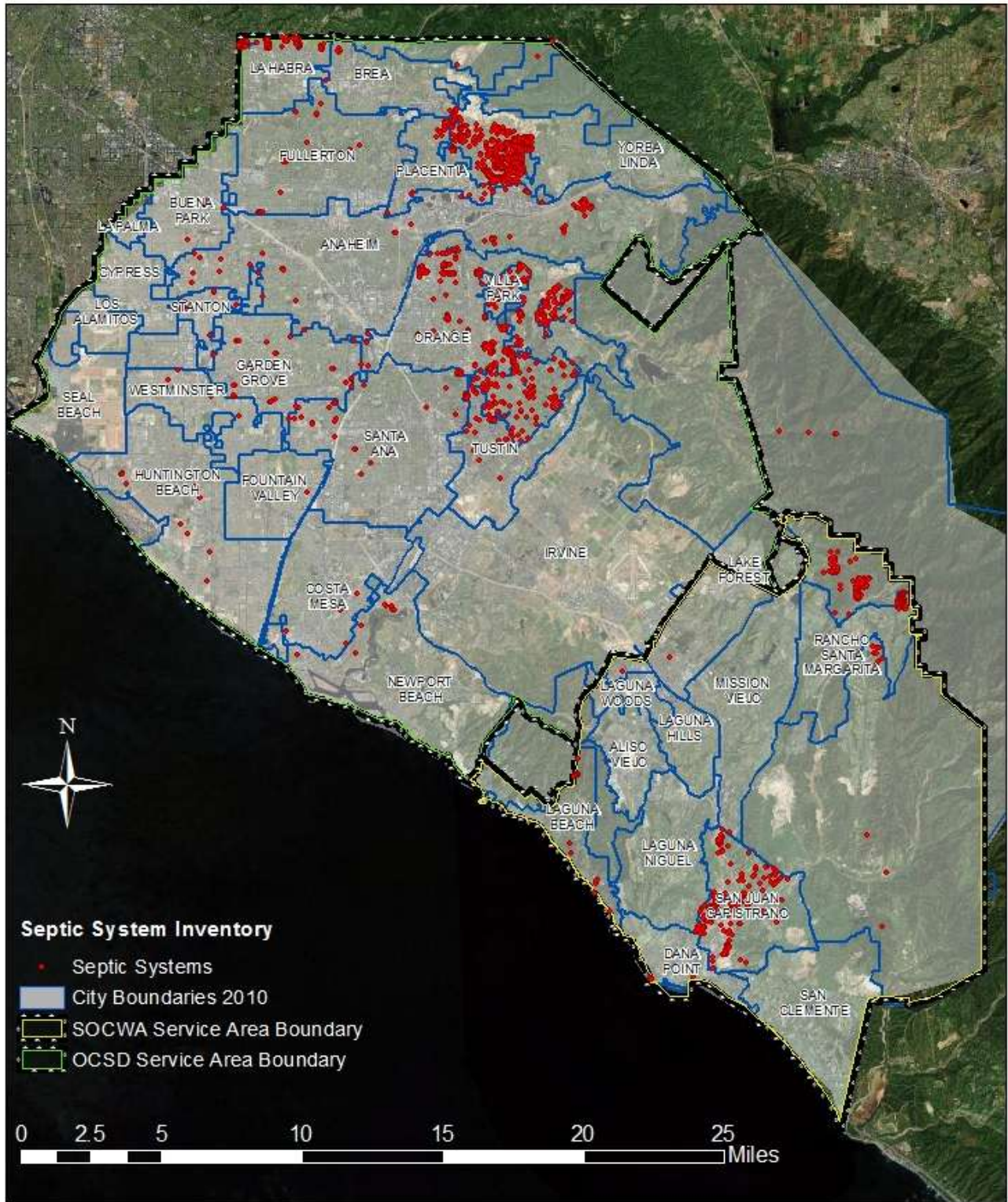


Figure 6: Septic Systems

<sup>7</sup> All the assessor parcel numbers (APN) that had demolition permits of septic systems shown as completed were removed from the 2003 inventory, and the APNs having building permits for new septic systems were added to the inventory. The updated database was then cross-referenced with data provided by OCSD listing APNs that have converted from septic to sewer and APNs that are confirmed as being active septic systems (meaning the owner received a refund for the sanitary sewer fee automatically assessed to all parcel numbers within OCSD's boundary).

## Countywide Septic System Inventory 2011



Data provided by OC Public Works  
Base Map: provided by Bing Maps aerial hybrid photo

Figure 7: Orange County Septic System Inventory

### Projected Sewer Flows

The results of the updated inventory are summarized in **Table A** along with the estimated additional wastewater flow that is expected from properties connecting to public sewer systems. The additional sewage flows resulting from the conversion of the County’s remaining septic systems are not significant enough to impact the regional collection systems.

**Table A- Estimated Additional Wastewater Flow to Collection System**

	OCSD	SOCWA
# of Septic Tanks	1823	844
Additional wastewater flow from conversion of septic systems to public sewer in gallons per day. <sup>8</sup>	410,175	189,900

### Countywide Findings

The *2010 Orange County Infrastructure Report Card* gave the County’s sewer infrastructure a B+ grade. This was an improvement from the two previous reports (2002 & 2005) which gave the County a grade of C+ on both occasions. This LAFCO report supports the Infrastructure Report Card’s findings and builds on the work done in the population and sewer demand analysis. The countywide assessment of the projected sewer demand confirms the preliminary findings of LAFCO’s initial report presented in April 2011 to the Commission. The report found the County to be well prepared for the additional sewer demand generated from the projected population growth through 2030. LAFCO continued to analyze countywide sewer infrastructure to broaden the understanding of sewer capacities.

### Countywide Projections

A countywide data set was chosen using the most recent population projection data from the *2010 Orange County Projections*, provided to LAFCO by Orange County Transportation Authority (OCTA) for use in this project.

Based on the demand within OCSD and SOCWA, the following map demonstrates the projected sewer demand through 2030. **Figure 8** depicts areas projected to have the highest increase in sewer demand in red, moderate increase are shown in pink, while areas showing net declines are white and areas with no changes in sewer demand are shown as grey. It should be noted that similar to the sewer sheds discussed earlier, the transportation analysis zones (TAZ) boundaries vary in geographic size and do not conform to the service boundaries of local agencies. These TAZ boundaries were used

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<sup>8</sup> Single-family units (assuming 3 persons per unit).

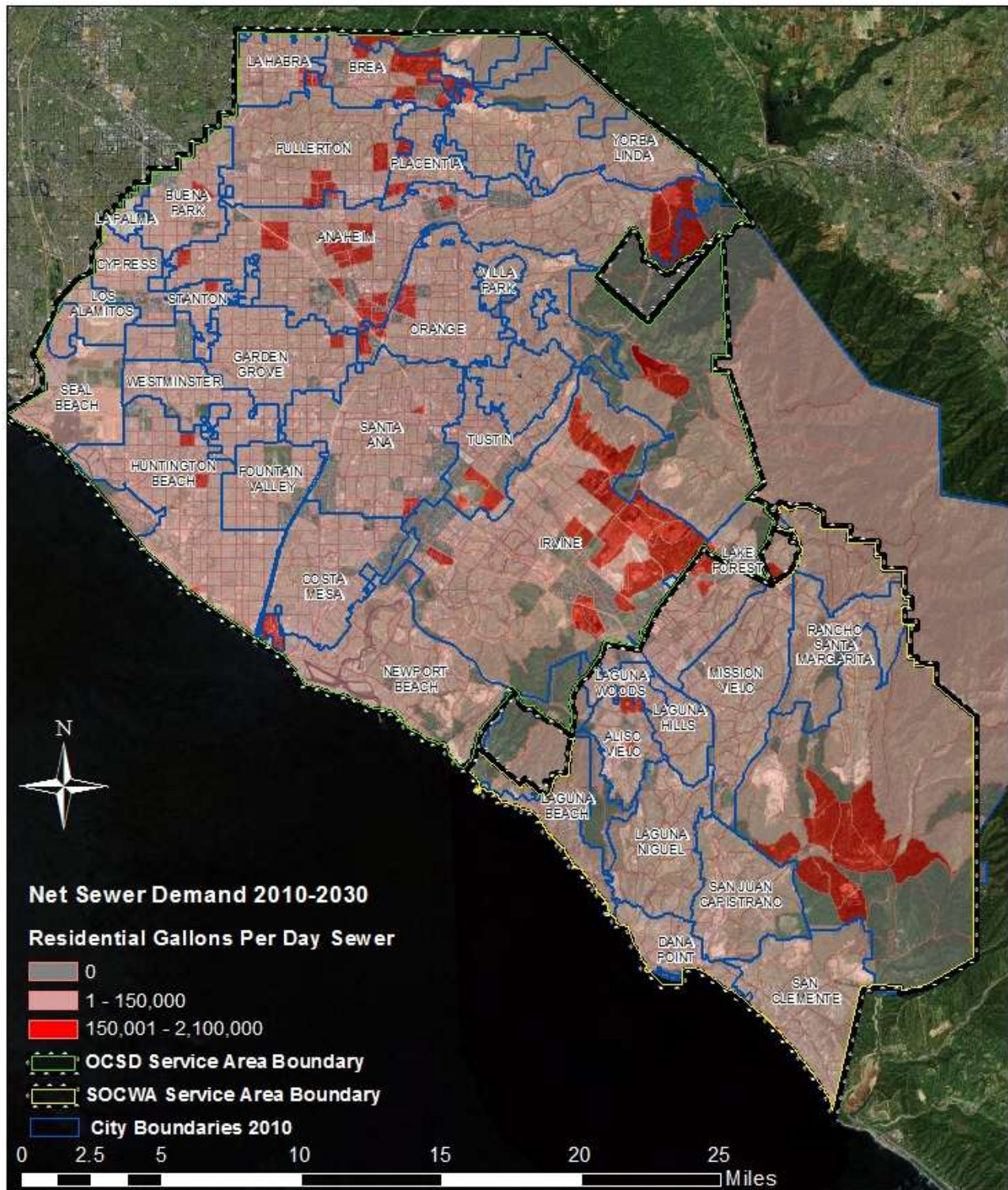
to calculate the average residential sewer demand provided by the Santa Margarita Water District and OCSD.<sup>9</sup>

The countywide map depicted below (**Figure 8**) conforms to the OCSD service map depicted in **Figure 3** of this report and supports the agency's hydraulic modeling program. Similar to **Figure 3**, the majority of the areas depicting the highest increases in demand in **Figure 8** correspond to areas with approved entitlements for large residential developments. There are four significant developments occurring in Northern Orange County - Tonner Hills in North Brea, The Great Park in Irvine, the Platinum Triangle in Anaheim, Tustin Legacy in Tustin, and one in Southern Orange County - The Ranch Plan in Rancho Mission Viejo. Additionally, the *2011 Orange County Sustainable Communities Strategy* (SCS) recently adopted by the Orange County Council of Governments (OCCOG) identifies these areas to be where the majority of the forecasted population growth will occur over the next 20 years. Analysis in this report confirms that Orange County sewer infrastructure is ready for the anticipated increase in sewer demand from projected population growth.

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<sup>9</sup> An average residential sewer demand of 159 gallons per capita per day (GPCD) was provided by Santa Margarita Water District for the SOCWA service area. For OCSD's service area, an average of 172 GPCD was obtained by calculating the mean residential GPCD of the 921 sewer sheds.

## Countywide Net Sewer Demand 2010-2030



Data Shown by Traffic Analysis Zones (TAZ)  
Source: 2010 OC projections provided by OCTA, Sewer data provided by OCSD and SOCWA  
Base Map: provided by Bing Maps aerial hybrid photo

Figure 8: Countywide Net Sewer Demand (2010-2030)



## WATER INFRASTRUCTURE & POPULATION GROWTH ANALYSIS

Orange County has over 30 water agencies providing drinking water to 3.2 million residents. The table below details the water providers by type of agency and identifies each water provider in the County.

**Table B: Retail Water Service Providers<sup>10</sup>**

Agency	# in OC	Name
<b>Cities</b> <i>(Public – local government)</i>	18	Anaheim, Brea, Buena Park, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, La Habra, La Palma, Newport Beach, Orange, Rancho Santa Margarita, San Clemente, San Juan Capistrano, Santa Ana, Seal Beach, Tustin, Westminster
<b>Special Districts</b> <i>(Public – local government)</i>	11	East Orange CWD, El Toro WD, Irvine Ranch WD, Laguna Beach CWD, Mesa WD, Moulton Niguel WD, Santa Margarita WD, Serrano WD, South Coast WD, Trabuco WD, Yorba Linda WD
<b>Mutual Water Companies</b> <i>(Mutual non-profit corporation)</i>	9	Canyon RV Park, Catalina Street Pump Owners, Crescent Water Association, Diamond Park Mutual Water Co., Eastside Water Association, Hynes Estates Mutual Water Co., Liberty Park Water Association, Page Mutual Water Company, South Midway City Mutual Water Co.
<b>Private Water Companies</b> <i>(Private company)</i>	2	American Water Systems, Golden State Water Company

The majority of retail water service is provided by public agencies. The 12 mutual water companies identified in **Table B** provide service to small, often isolated areas. Legislation recently passed by the legislature (AB 54) may help to clarify service boundaries by requiring the companies to provide LAFCO with maps of their boundaries. In addition to retail water service, the County has three agencies responsible for importing water and one special district charged with maintaining Orange County’s groundwater supplies.

The following discussion provides an overview of the potential impacts of Orange County’s projected population growth to the water infrastructure and

*“We never know the worth of water till the well is dry.”*

*~Thomas Fuller*

<sup>10</sup> Additional water systems include: Canyon RV Park, Caspers Regional Wilderness Area, Knotts Berry Farm, Lazy Ranch Water System, Los Alamitos Race Course

demand. The report includes a general discussion on the County's water resources, urban water management, projected water demand, water legislation, and alternative water supplies in Orange County.

### Water Resources in OC

Currently, Orange County relies on four water supply sources to meet the needs of its growing population: imported, ground, surface and recycled. **Figure 9** depicts the current and projected demands by each water source for 2010 and 2030. As depicted in **Figure 9**, imported and ground water supplies provide more than 90% of the County's drinking water.

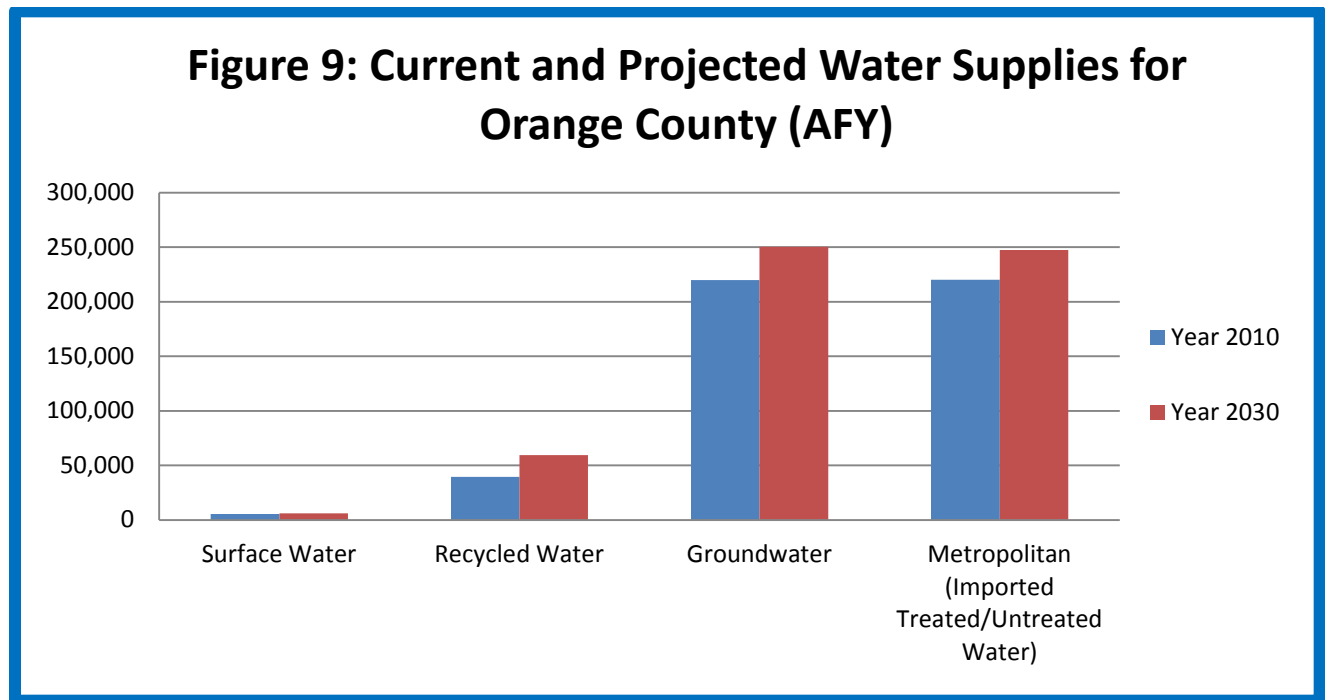


Figure 9: Water Demand by Supply Source (2010 & 2030)

### **Groundwater**

OCWD manages the County's groundwater basin, which supplies approximately 60% of north and central Orange County's water demand. OCWD works with 23 cities and special districts to serve more than 2.3 million people with safe and reliable drinking water. Alternatively, South Orange County relies almost exclusively on imported water to meet its water demands (approximately 95%).<sup>11</sup>

The groundwater basin creates a disparity between North and South Orange County with the northern portion being able to offset imported water with local groundwater

<sup>11</sup> MWDOC 2010 Regional Urban Water Management Plan (August, 2011)

supplies. With limited access to groundwater supplies, South County water agencies have been on the forefront of innovative approaches to local sources of alternative water supplies, including: water reclamation, ground water recharge and water banking. These alternative water sources will be highlighted at the end of this section.

### **Imported Water**

Most of the remaining water demand is provided through wholesale water importers. The Metropolitan Water District of Southern California (MWD) provides imported water to 19 million people in parts of Los Angeles, Orange, San Diego, Riverside, San Bernardino, and Ventura counties. There are four local member agencies in MWD, receiving imported water from the State water project and the Colorado River to serve Orange County residents.<sup>12</sup> The Municipal Water District of Orange County redistributes imported water to 28 local retail water agencies consisting of cities, special districts, and a private water company.

### **Urban Water Management**

Water agencies are required to prepare and adopt an urban water management plan (UWMP) every five years. These documents are important in providing a long-range assessment of the water services, sources and supplies within an agency's service area. MWDOC has developed a Regional Urban Water Management Plan (RUWMP) for all water agencies in Orange County, excluding the three non-member agencies of Anaheim, Fullerton, and Santa Ana.

While this State mandate ensures that every service area is analyzed on a regular basis, there appears to be the opportunity to increase its efficiency. The retail and wholesale water providers may be able to work collectively to reduce redundancies in writing these plans. There may also be the opportunity for a legislative approach to reducing the duplication of this mandate on the local and regional levels.

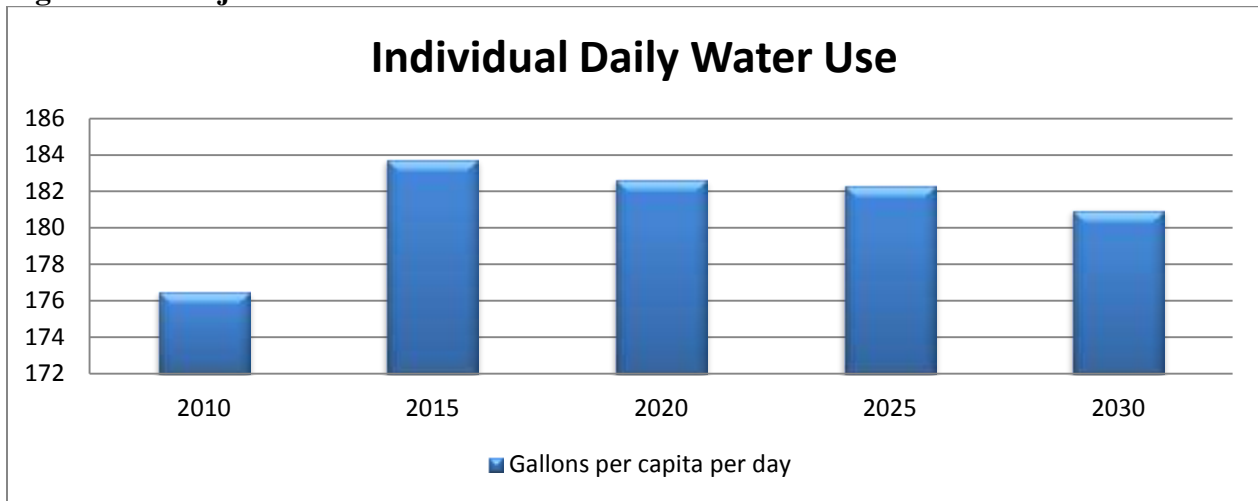
### **Projected Water Demand**

This section examines the current projections, and the next section will analyze the impacts of legislative efforts focused on further reductions of water demands. **Figure 10** shows the average daily per capita water use over the next 20 years for the average OC resident. Surprisingly, the figure forecasts a modest net increase of approximately four gallons per day per person during the 20-year period.

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<sup>12</sup> These include the Municipal Water District of Orange County (MWDOC), and the Cities of Anaheim, Fullerton, and Santa Ana.

**Figure 10 – Projected Water Use<sup>13</sup>**



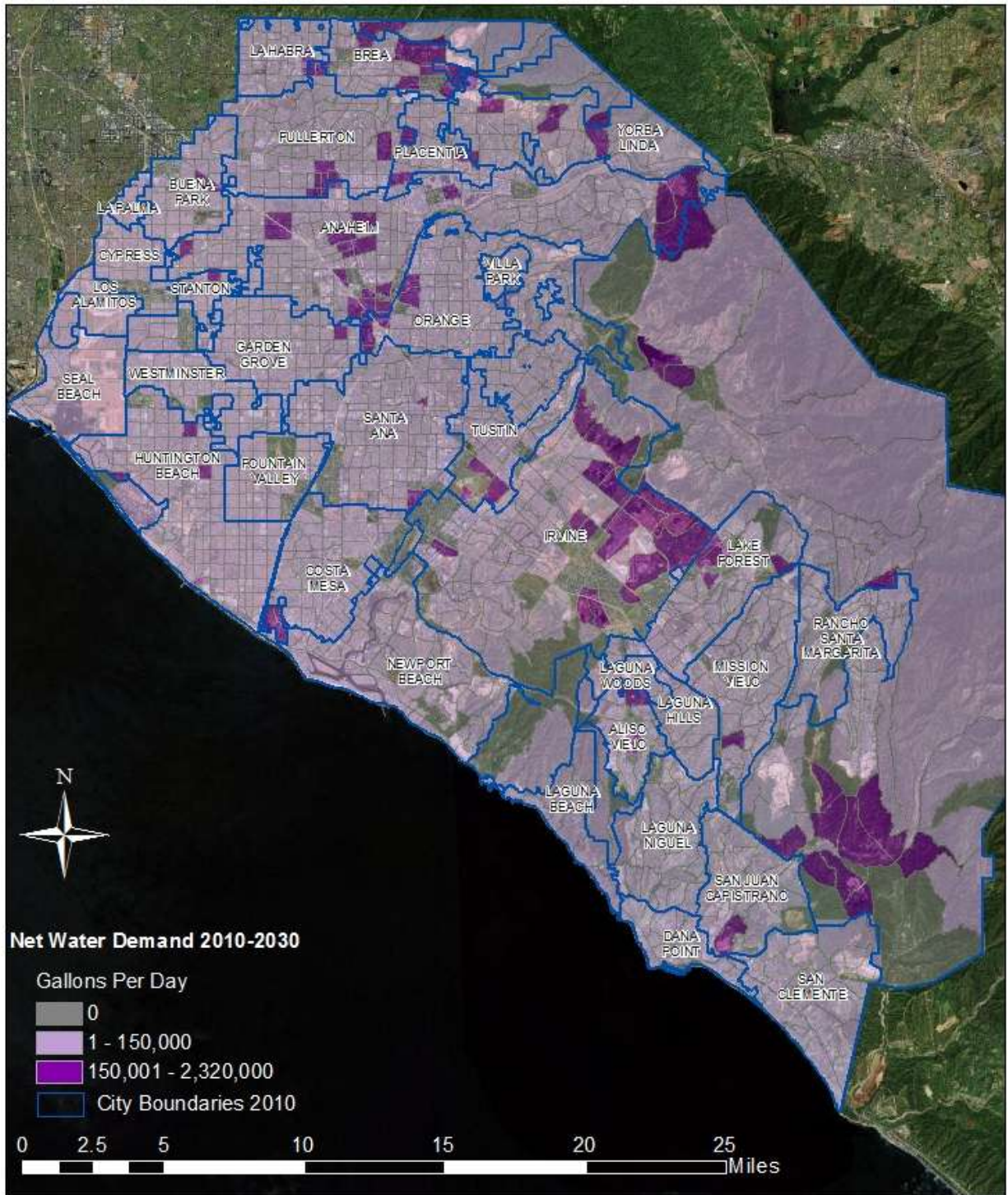
The data shown in **Figure 10** was used to create **Figure 11** (below).<sup>14</sup> **Figure 11** depicts the Countywide Net Water Demand for the twenty year period from 2010 to 2030.

The areas in dark purple represent the highest projected increases in water demand. The areas with only a moderate increase in demand are shown in light purple and finally the areas with no change in water demand are shown in gray. Similar to the maps in the sewer infrastructure analysis, the areas of concentrated water demand increases correlate with known high density development projects.

<sup>13</sup> MWDOC 2010 Regional Urban Water Management Plan (August, 2011); UWMPs for the Cities of Santa Ana, Fullerton & Anaheim (August, 2011).

<sup>14</sup> The data was integrated into GIS data obtained from the Orange County Transportation Authority (OCTA) and the Center for Demographic Research (CDR).

## Countywide Net Water Demand 2010-2030



Data Shown by Traffic Analysis Zone (TAZ)  
Source: water data from MWDOC's 2010 Regional UWMP and Metropolitan's 2010 IRP. All other data provided by LAFCO  
Base Map: provided by Bing Maps aerial hybrid photo

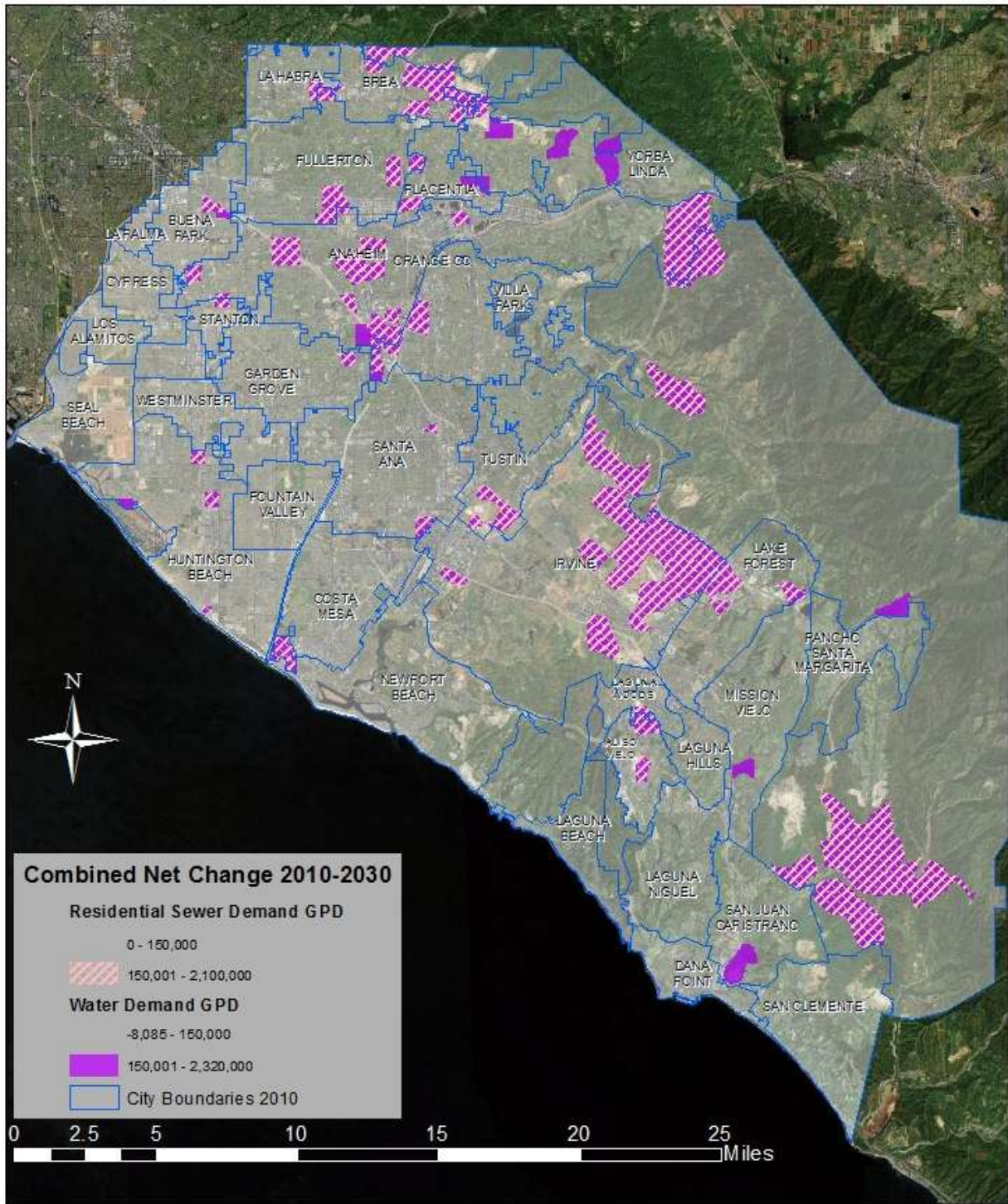
Figure 10: Countywide Net Water Demand (2010 – 2030)

### Comparing Water and Sewer Demand

While the water demand projections in **Figure 10** are similar to the sewer demands depicted in the previous section, the following map (**Figure 11**) was created to show the areas with the highest growth rates for both water and sewer demand throughout the County. **Figure 11** depicts the highest water demand increases in purple, with areas of substantial sewer demands depicted in pink crosshatch. After reviewing **Figure 11**, it becomes clear that the water and sewer demand for the upcoming years are projected to increase at a similar rate.

The areas identified in **Figure 11** correspond to approved projects which had their anticipated sewer demands assessed and approved by the local sewer service provider. Water agencies expecting to see the largest increases include the City of Anaheim (Platinum Triangle), Irvine Ranch Water District (Great Park) and the Santa Margarita Water District (The Ranch Plan in Rancho Mission Viejo). Areas showing high increases in water demand without the corresponding high increases in sewer demand (e.g. purple without crosshatch) are due to homes receiving water service but not the corresponding sewer demand. This can be explained by areas with high density of septic tanks or locations include industrial areas with high water demand and low sewer demands.

### Highest Demand Regions for Sewer and Water Demand 2010-2030



Data Shown by Traffic Analysis Zone (TAZ)  
Base Map: provided by Bing Maps aerial hybrid photo

Figure 11: Correlation of Sewer and Water Demand (2010-2030)

### Legislative Impact to Water Demand

Recent legislation requires water agencies to further reduce water demand by 2020. The Water Conservation Act of 2009 (SBx7-7) requires each retail water agency to develop urban water use targets to reduce the statewide average per capita daily water consumption by 10% in 2015 and 20% by 2020. Water recycling deduction credits were included in the Water Conservation Act to encourage regional collaborations based on greater economies of scale for large projects such as reclamation facilities.

Orange County water agencies have chosen to form the Orange County 20x2020 Regional Alliance to collectively benefit from regional investments such as the Groundwater Replenishment System (GWRS) and other regional reclamation programs.<sup>15</sup> The GWRS alone accounts for a reduction credit of 5.6% and is anticipated to fully accomplish the 20% by 2020 with the current Phase 2 expansion of the plant.

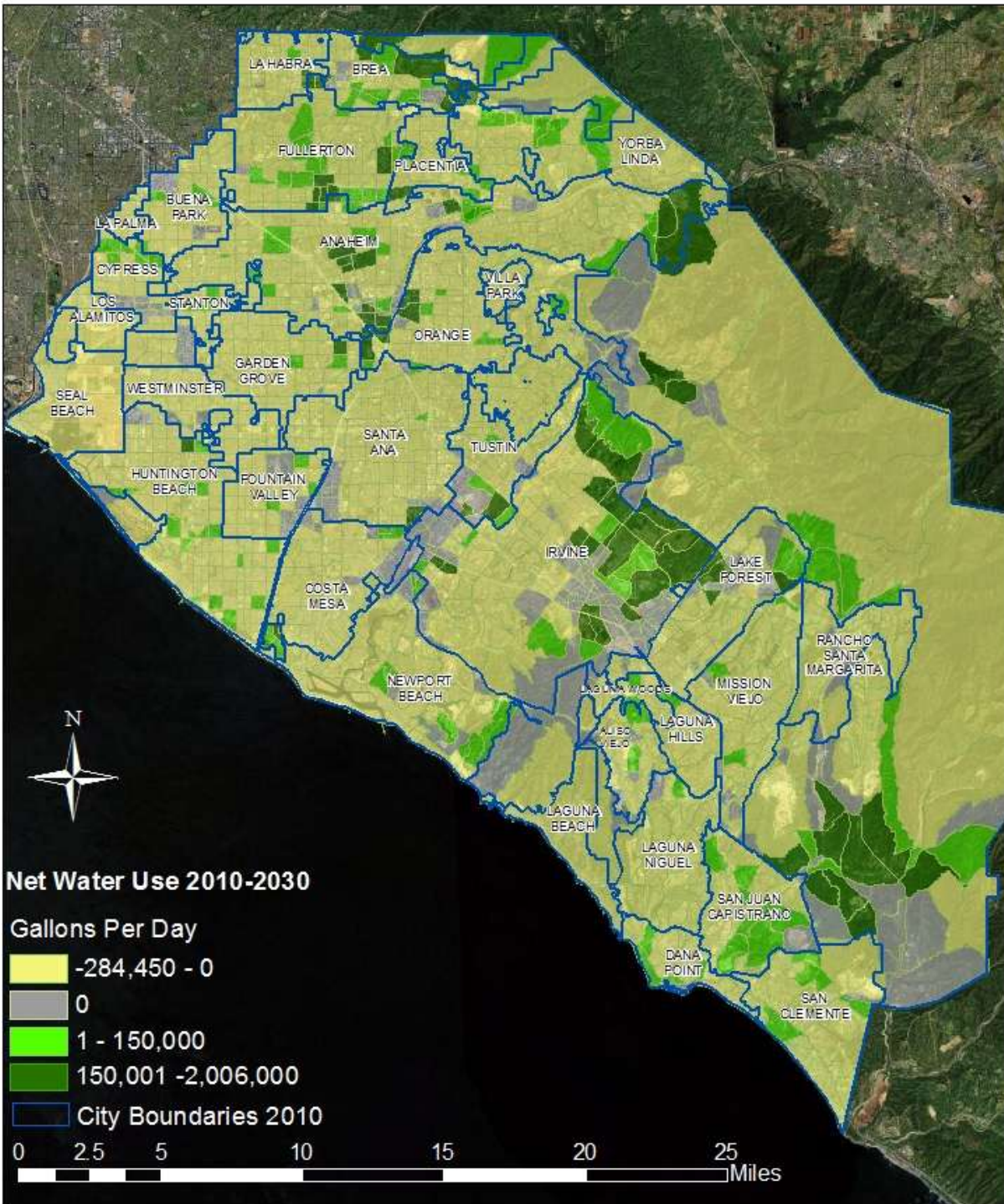
**Figure 12** is a hypothetical countywide representation of the net water demand for 2010-2030 using the 20% by 2020 Regional Alliance water use targets. The map depicts (in yellow-green) moderate declines in water use demands throughout the majority of the County. When compared with **Figure 10**, **Figure 12** demonstrates a significant switch in county water demands over the next 20 years. The vast majority of the County is depicted in yellow green indicating net declines in water demand. The areas least affected by the 20x2020 water reduction targets are depicted in dark green. These areas correlate with known large scale development projects mentioned previously and 20% reductions cannot be included as these are new projects without previous water use.

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<sup>15</sup> OC 20x2020 Regional Alliance consists of MWDOC and 26 of its member agencies, along with the Cities of Anaheim, Fullerton and Santa Ana.



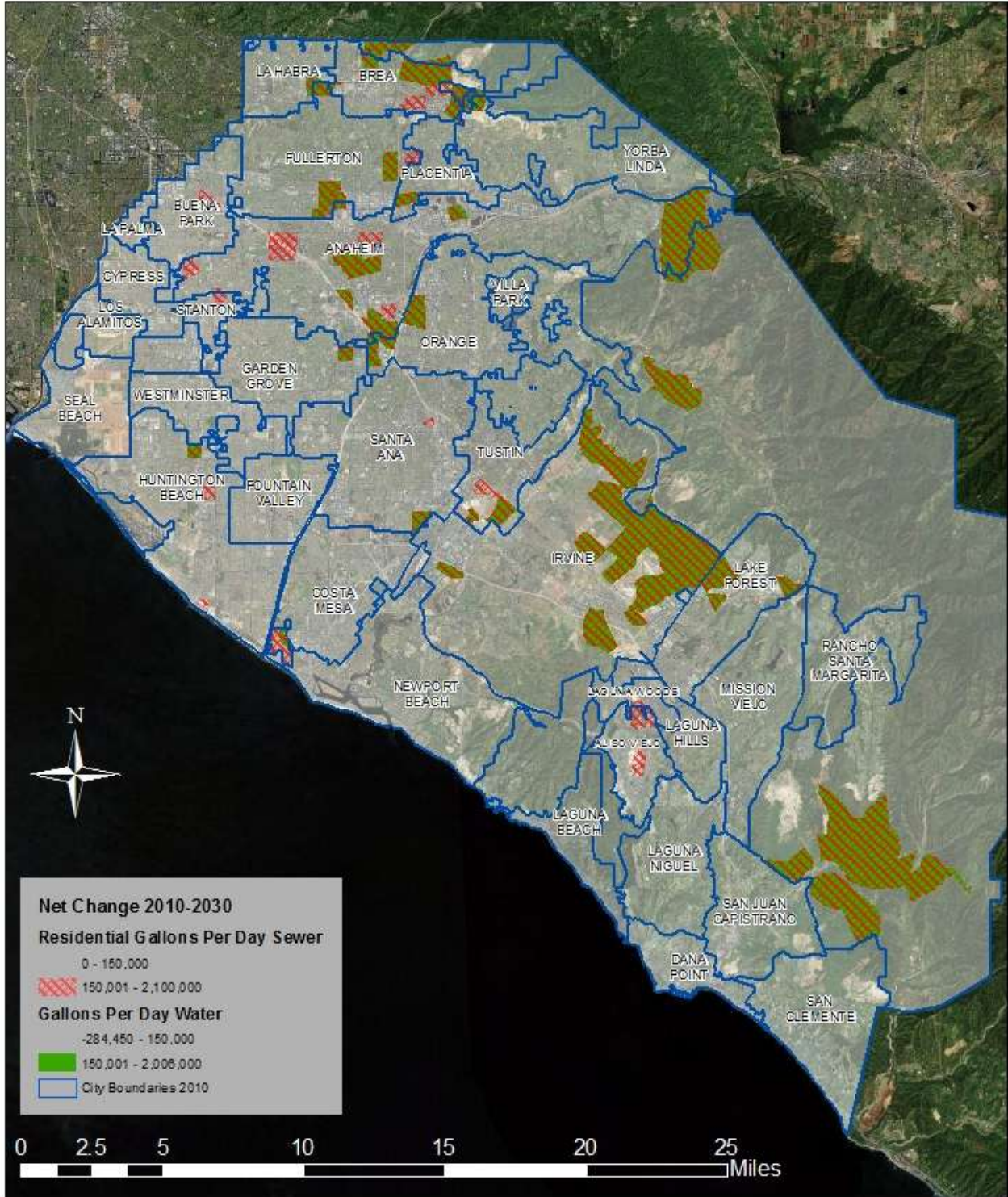
## Countywide Net Water Demand 2010-2030 20x2020 Regional Alliance Water Use Targets



Data Shown as Traffic Analysis Zones (TAZ)  
Source: data from MWDOC's 2010 Regional UWMP and Metropolitan's 2010 IRP. All other data provided by LAFCO  
Base Map: provided by Bing Maps aerial hybrid photo

Figure 12: 20x2020 Regional Alliance Projected Net Water Demand (2010-2030)

## Net Water and Sewer Demand 2010-2030 With 20x2020 Target Reduction



Data Shown by Traffic Analysis Zone (TAZ)  
 Base Map: provided by Bing Maps aerial hybrid photo  
**Figure 13: Water & Sewer Correlation (20X2020 Target Reduction)**

**Figure 13** was created to show the net water and sewer demand assuming the 20x2020 water use reductions. Sewer demands are depicted in pick cross hatch with water demands shown in green. The map only depicts the areas showing the highest increases in demand for water and sewer. This map shows fewer areas of high demand when compared with **Figure 11**. Unlike **Figure 11**, which showed the correlation between water and sewer projections, **Figure 13** shows areas of high increases in sewer demand without corresponding water demand. This report has drawn a clear correlation between water and sewer demands. While a reduction in sewer demand is anticipated, the data has not been updated to reflect the anticipated 20% water use reduction.

### Alternative Water Supplies

Efforts to increase alternative water supplies are not specifically driven by population projections or water demand. Governmental regulations, long-term sustainability, and escalating costs of water (on both retail agencies and consumers) are the drivers of water demands. Water agencies are enhancing water reliability through alternative water sources, such as groundwater basin expansions, groundwater recharging, water recycling, and water banking (or storage) outside the County, and desalination.

### Water Recycling

Water recycling can provide reliable, local sources of water, reducing the demand on imported water supplies and also reducing the amount of wastewater discharged into the ocean. For these reasons, the diversification of water supplies has received significant attention and investment by local water districts. MWDOC's 2010 Regional UWMP estimates a 50% increase in recycled water use by 2030 (see **Figure 9**). Examples of current water recycling programs are highlighted below.

### Groundwater Replenishment System (GWRS)

Orange County is home to the world's largest wastewater purification system. The Groundwater Replenishing System represents collaboration between OCWD and OCSD. These agencies have developed a state of the art water purification facility that purifies treated sewer water to high quality drinking water that exceeds all federal and state drinking water standards. The facility produces enough water to serve 600,000 people per day. Half of the water produced is injected into the groundwater to prevent sea water intrusion along the Pacific Coast. The other half is sent to percolation ponds located along the Santa Ana River in Anaheim to reenter the groundwater naturally. The



facility uses one third of OCSD's treated wastewater that would otherwise be disposed in the ocean. This process uses less than one third of the energy that it takes to desalinate ocean water and it uses less than half of the energy required to pump imported water from Northern California. OCSD and OCWD have begun expansion of the system to increase production to serve approximately 850,000 people per day by 2012.

#### Additional Water Recycling (Reclamation) Projects

Additional projects aimed at increasing local water sources are listed in the table below. All projects are discussed in detail in the MWDOC RUWMP and the UWMPs of the local retail water district, but a few are highlighted in **Table C** to demonstrate current expansion projects that will help to reduce imported water demands.

**Table C: Water Reclamation Projects**

Facility	Agency	Current Output	Proposed Output	Completion Date
Michelson Water Reclamation Plan	Irvine Ranch Water District	18 MGD <sup>16</sup>	28 MGD	2012
San Clemente Water Reclamation Plant	City of San Clemente	2.2 MGD	4.4 MGD	2013
Chiquita Water Reclamation Plan	Santa Margarita Water District	8 MGD	10 MGD	2015
<b>Total</b>		28.2 MGD	42.2 MGD	

#### **Water Banking**

Groundwater recharge programs like the GWRS described above are available to those agencies with access to groundwater basins. Agencies without groundwater basins to manage have begun to look outside the County for additional groundwater storage opportunities. Groundwater storage, also known as water banking, allows for agencies to diversify their water supply portfolios, and prepare for years of drought or natural disasters that may impact imported water supplies. Locally, the Irvine Ranch Water District (IRWD) has explored water banking opportunities outside Orange County. The District has entered into the Strand Ranch water banking program allowing for the District to store water in the Kern County groundwater basin.<sup>17</sup> IRWD is also exploring the opportunity to store additional water in Kings County.

<sup>16</sup> Million gallons per day.

<sup>17</sup> <http://www.irwd.com/your-water/water-supply/water-banking.html>

### **Desalination**

The conversion of ocean water to drinking water, known as desalination, includes high energy costs and substantial environmental regulations. However, as the cost of imported water increases, the benefits and parity of desalination become a more acceptable investment.

There are two projects currently analyzing the potential for desalination along Orange County's coastline. The City of Huntington's Seawater Desalination Project and the Dana Point Project. Both projects have the potential to provide up to 8% and 3% (respectively) of the County's overall water supply needs. The Huntington Beach project is currently awaiting approval from the Coastal Commission and the Dana Point project is still in the planning stages, both projects are anticipated to be completed within the next ten to fifteen years.

### **Heading in the Right Direction**

This report depicts the water demands, given existing infrastructure and planned infrastructure improvements. Although at a slower rate, the County's reliance on imported water from MWD is projected to increase. The projections do not currently include some of the anticipated projects which will provide alternative local water supplies and decrease the dependence on imported water. Many local water agencies see desalination as the only way to ensure adequate local water supplies given population projections and increasing environmental constraints to the imported water supplies.

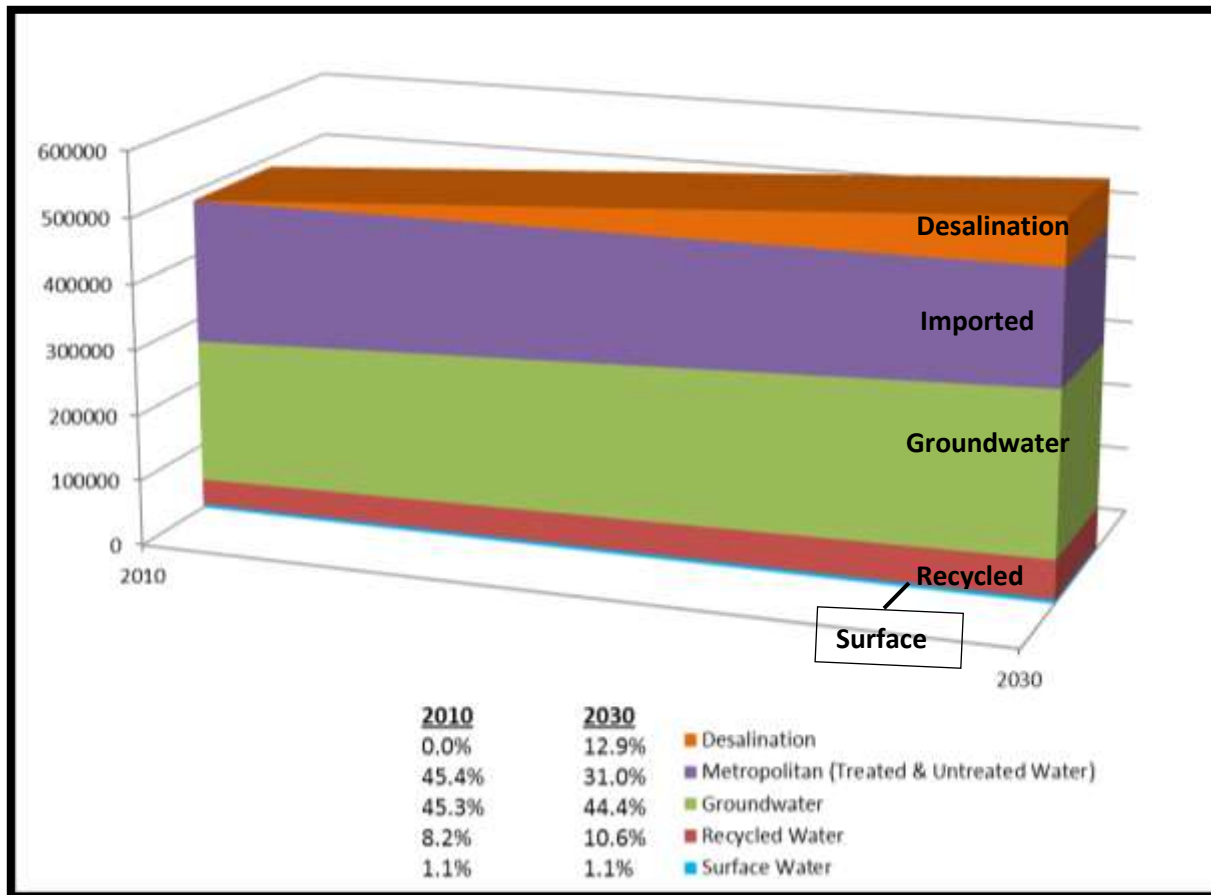


Figure 14: Hypothetical 2030 scenario including desalination

**Figure 14** depicts a 2030 future scenario where water demand projections are held constant and the MWD imports are reduced by the amount of water brought into the system by the Huntington Beach and Dana Point desalination projects. Should this scenario become reality, local water supplies would account for approximately 70% of the County’s total projected water demand reducing the County’s dependence on imported sources of water.

Each water service provider in Orange County has a specific role to play in ensuring adequate and sustainable water supplies. Overall, this section of the report has identified the sufficiency of the infrastructure and the maintenance programs in place for the current and projected populations of Orange County.

## NATURAL DISASTERS – OC PREVENTION

The latest earthquakes and tsunamis across the globe create international concerns. In Orange County, the question of a natural disaster is not *if* or *what* might happen, but *when* it will happen. Fortunately, the United States Geological Survey (USGS) and Orange County agencies have evaluated potential concerns and have begun to prepare for the worst case scenarios.

*“Planning is the cornerstone to successful hazard mitigation efforts.”*

This section highlights how Orange County has prepared for the potential impacts of natural disasters on the water and sewer infrastructure. The discussion also includes the current procedures established by local Orange County agencies to mitigate those impacts.

### The Next Big One

The Southern California Earthquake Center report (SCEC, 1995) indicated that the next earthquake with a magnitude of seven or greater is likely to occur in southern California before 2024. While earthquakes cannot be accurately predicted, Orange County agencies are taking proper prevention measures to reduce potential damages.

The USGS conducted the 2008 Shakeout Earthquake Scenario, which noted the next earthquake would most likely break many roads, tracks, or pipes that cross a specific fault line. Destruction of water and sewer infrastructure, specifically pipelines, could result in the lack of drinking water and possible water contamination. **Figure 15** depicts active fault lines in Orange County and their proximity to water and sewer infrastructure.<sup>18</sup> Water infrastructure (including imported treated/untreated and local transmission lines) is depicted in blue. OCSO regional sewer infrastructure is depicted in purple and known fault lines are depicted in black.

Based on the proximity of various fault lines to existing infrastructure, a major earthquake could result in the disruption of water and/or sewer service to different areas of the County. The Hazard Mitigation plans by Orange County and MWDOC address these concerns and local agencies have planned for potential disruptions with additional pipe connections and alternative water storages.

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<sup>18</sup> For security of the infrastructure we have created a mile wide buffer over the infrastructure to obscure its location.

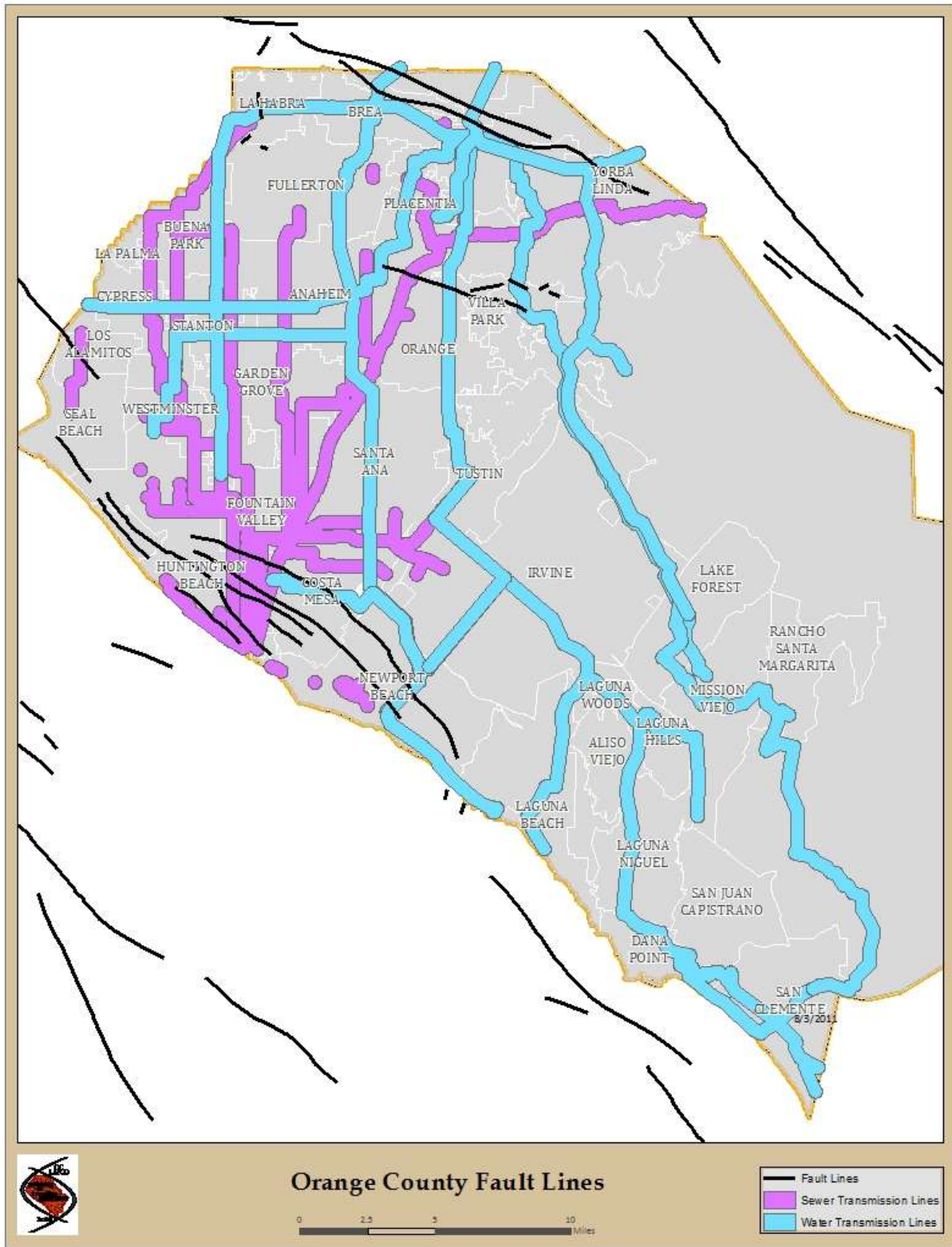


Figure 15: OC Fault lines & proximity to sewer and water infrastructure



### Orange County is Prepared

MWDOC and several other OC water agencies developed the Hazard Mitigation Plan (The Plan) to prepare for an upcoming natural disaster.<sup>19</sup> The Plan will be revised continuously to accommodate the changes in the County's demographics.<sup>20</sup> The Plan not only discusses earthquakes and floods, but also addresses dam failures, drought, liquefaction, power outages, landslides, fire, tornadoes, even human-caused hazards.



and

In addition to the Plan described above, MWDOC was instrumental in coordinating with the former Coastal Municipal Water District and the Orange County Water District to form the Water Emergency Response Organization of Orange County (WEROC).



Active since 1983, WEROC represents all water and sewer agencies in the County. Its main objective is to coordinate emergency response for any major disaster.

Additionally, Orange County and the Orange County Fire Authority jointly prepared a Hazard Mitigation Plan in 2009.<sup>21</sup> The report is similar to the 2007 report prepared by MWDOC covering multiple hazard events. The report also includes a vulnerability assessment of County structures, hazard mitigation strategy and plan maintenance.

Orange County has engaged in many efforts and put many programs in place in preparation of a natural disaster. These established programs promote awareness, responsiveness, and preparedness in the event of a natural disaster.

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<sup>19</sup> Participants in the Hazard Mitigation Plan include: Municipal Water District of Orange County, Orange County Water District, Orange County Sanitation District, South Orange County Water Authority, City of Buena Park, El Toro Water District, City of Garden Grove, City of La Habra, Laguna Beach County Water District, Mesa Consolidated Water District, Moulton Niguel Water District, City of Newport Beach, City of Orange, Santa Margarita Water District, Serrano Water District, South Coast Water District, Trabuco Canyon Water District, City of Tustin, City of Westminster, and Yorba Linda Water District. Since these agencies pertain to unique areas, each agency developed their own goals to reduce potential damages from natural disasters.

<sup>20</sup> The report is available on the California Emergency Management Agency's website:

[http://hazardmitigation.calema.ca.gov/docs/lhmp/Municipal\\_Water\\_District\\_of\\_Orange\\_County\\_LHMP.pdf](http://hazardmitigation.calema.ca.gov/docs/lhmp/Municipal_Water_District_of_Orange_County_LHMP.pdf)

<sup>21</sup> Available at: [http://cams.ocgov.com/Web\\_Publisher/Agenda03\\_15\\_2011\\_files/images/O01409-001806E.PDF](http://cams.ocgov.com/Web_Publisher/Agenda03_15_2011_files/images/O01409-001806E.PDF)

## **CONCLUSION**

California State law requires LAFCO to review the delivery of services from cities and special districts in each 58 counties. This report completes two of the determinations required through this legislation: (1) *Growth and population projections for the affected area* and (2) *Present and planned capacity of public facilities and adequacy of public services*. The delivery of water and sewer services to all residents is vital to Orange County. Based on LAFCO's analysis, all affected agencies can deliver these services efficiently to the projected growth in population.

Water and sewer service have over time become increasingly intertwined. The water supply in California has been decreasing for years and our local agencies continue to find alternative ways to meet the demand in Orange County. Whether it is promoting conservation to the public or utilizing water banks, local agencies are diligently working towards a more efficient way to delivery water. While it is not as popular as water discussions, sanitary districts also have a significant role in the County. The proactive efforts from the agencies reduce the impact of the growing population to the infrastructure. Ultimately, the water and sewer services are intertwined. The latest advancement in technology allows sanitary districts to work with water agencies in exploring the opportunity to produce alternative water supply.

The brief analysis in this report indicates that Orange County is prepared for the events of a natural disaster. The development of multiple Hazard Mitigation Plans and emergency response organizations (i.e. WEROC) represents the dedicated efforts of OC agencies to protect its residents.

This report reinforces that Orange County has prepared its infrastructure for the impacts of population growth and natural disasters. The County has done this through innovative programs and efforts that address both short and long-term infrastructure interests.